RISK IDENTIFICATION AND ASSESSMENT

IN A RISK BASED AUDIT ENVIRONMENT:

THE EFFECTS OF BUDGET CONSTRAINTS AND DECISION AID USE

A Dissertation

by

MICHELLE CHANDLER DIAZ

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2005

Major Subject: Accounting

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Approved by:

Chair of Committee,	Christopher J. Wolfe
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ABSTRACT

Risk Identification and Assessment in a Risk Based Audit Environment: The Effects of Budget Constraints and Decision Aid Use. (August 2005)

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Chair of Advisory Committee: Dr. Christopher J. Wolfe

Risk based audit (RBA) approaches represent a major trend in current audit methodology. The approach is based on risk analysis used to identify business strategy risk. The RBA has created a new set of research issues that need investigation. In particular, this approach has important implications for risk identification and risk assessment. The success of the RBA approach is contingent on understanding what factors improve or interfere with the accuracy of these risk judgments.

I examine how budget constraints and decision aid use affect risk identification and risk assessment. Unlike previous budget pressure studies, I cast budget constraints as a positive influence on auditors. I expect more stringent budget constraints to be motivating to the auditor as they provide a goal for the auditor to achieve. I also expect budget constraints to induce feelings of pressure leading to the use of time-pressure adaptation strategies. When auditors have use of a decision aid, they take advantage of these motivational goals and/or use beneficial adaptive strategies.

Overall, I find that auditor participants tend to be more accurate when identifying financial statement risks compared to business risks. Budget constraints have no effect on risk identification for financial or business risks; they also have no effect on financial

risk assessments. On the other hand, business risk assessments are improved by implementing more stringent budget constraints, but only when a decision aid is also provided.

Budget constraints can affect performance through a goal theory route or a time-pressure adaptation route. I investigate the paths through which budget constraints improve business risk assessments under decision aid use. I find that budget constraints directly affect performance, supporting a goal theory route. However, I do not find that budget constraints are mediated by perceived budget pressure as expected. Auditors appear to use a positive adaptive strategy to respond to perceived budget pressure, however perceived budget pressure is not induced by providing a more stringent budget.

DEDICATION

I dedicate this dissertation to my family.

To my husband, Juan, who has provided me with love and support throughout this whole process and took the risk to follow his girlfriend to College Station, Texas, four years ago. I know you never imagined you would end up here, but it has worked out pretty well. I look forward to sharing many more successes together wherever that may lead us.

To my beautiful baby, Daniela, this dissertation was why I moved to College Station, but the best things I have done since coming here have been marrying your dad and having you.

To my parents, Michael and Gabriele, who have always believed I was capable of accomplishing anything. Thanks for your continual support and encouragement.

To my brother, Joe, who eased my transition into Aggieland and taught me about important things like Freebirds and Wings N More. Thanks for being such a great brother.

I love you all very much.

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CHAPTER I

INTRODUCTION

This study seeks to answer three major questions. First, do auditors have different ability when identifying different types of risks for the audit? Next, do budget constraints positively affect risk analyses on the audit?[1] Finally, how do budget constraints cognitively influence risk assessments? I address these questions within the unique environment of the risk based audit (RBA)[2]. Understanding risk identification and assessment within the RBA environment is important because there is speculation that auditors have limited ability to perform these tasks (Weil 2004). Ascertaining factors that can hinder or help the risk analysis processes of RBA affords opportunities to improve audits and possibly reduce audit failures.

Risk-based audit approaches represent a major trend in current audit methodology. Developed during the 1990s in response to changes in the business and economic communities, the RBA represents a "new generation" of audit approaches (Lemon et al. 2000). RBA approaches are based on risk analysis used to identify business risk, commonly defined as risk that a client will not achieve its business objectives. Although not all firms use RBA, a recent study of large, international firms found that most have implemented some form of the RBA (Lemon et al. 2000).

This dissertation follows the style of *The Accounting Review.*

[1] Throughout this paper, risk analysis is meant to refer generically to both risk identification and risk assessment.

[2] I use the term risk based audit throughout this text. It is meant to be a generic reference to all audit approaches that use this type of methodology. This is not meant as a reference to any single methodology, but instead speaks to the general trend of risk-based auditing described in Lemon et al. (2000).

The RBA represents a shift in thinking about how best to audit an entity, but it is still rooted in the ideas of risk evaluation and knowledge of the client advocated by the audit risk model (Lemon et al. 2000). The RBA approach can be thought of as a broadening of many of the concepts and procedures used in a traditional audit, and it is based on a holistic view of the client business while the traditional approach is based on a financial statement view (Bell et al. 1997; Bell et al. 2002; Bierstaker and O'Donnell 2003; Lemon et al. 2000). Understanding what the financial statements say about the company is certainly a part of the RBA, but the RBA demands additional client understanding developed through strategic analysis, management discussion, and industry training (Lemon et al. 2000, 10). Within each aspect of the audit, the shift from the traditional approach to the RBA approach can appear to be subtle (Bell et al. 1997). When taken together, however, it is easy to see that the RBA approach makes a significant departure from the traditional methodology (Eilifson et al. 2001). Table 1 provides a summary of key differences between the traditional audit approach and the RBA approach.

RBA has created a new set of research issues that need investigation (Gramling et al. 2001). As auditors move to a risk-driven audit focus, new types of audit judgments are relevant. In particular, the shift has important implications for risk identification and assessment. Factors that interfere with or improve auditor ability to identify, assess, and ultimately reduce risk, are important to ensuring the success of the RBA approach. This study focuses on understanding how budget constraints affect risk identification and risk assessment, as well as proposing a solution for improving risk assessments.

Table 1.

Comparison of Traditional and Risk Based Audit Approaches[3]

Traditional Audit	Risk-Based Audit
Financial Statement/Transactions Cycle View	Holistic View of Client Strategic Objectives
Audit Risk	Business Risk
Accounting Information Processes	Critical Business Processes
Accounting and Auditing Expertise	Business and Industry Expertise
Understanding of the business	Understanding of business and the system of businesses in which the client operates
Partners develop rich mental models of client and business relationships	The whole engagement team shares rich mental models of the client and business relationships
Focus on processing errors as a source of financial misstatements	Focus on business environment, governance, and managerial control as sources for financial misstatements
Financial Statement Attestation	Value-added Client Service

There are several recent studies focusing on the advantages and disadvantages of the risk-based audit approach (Ballou et al. 2004; Ballou and Heitger 2003; Bierstaker and O'Donnell 2003; Choy and King 2002; Cullinan and Sutton 2002; Kotchetova 2004; O'Donnell and Schultz 2003). While these studies offer some insight into the RBA, none of these studies address the identification of audit risks. Also, previous studies have not addressed budget constraints within the RBA context. I expect that budget constraints affect the risk assessment portion of an RBA audit. For these reasons, this study contributes to the overall understanding of the RBA approach and its effectiveness within a realistic audit setting.

[3] The above table was compiled using the following sources: (Bell et al. 1997; Bell et al. 2002; Lemon et al. 2000).

Budget Constraints, Risk Identification and Risk Assessment

Budget pressure and time pressure have been studied extensively in the audit literature (Alderman and Deitrick 1982; Asare et al. 2000; Kelley and Margheim 1990; Kelley and Seiler 1982; Kermis and Mahapatra 1985; Lightner et al. 1982; Low 2004; Marxen 1990; McDaniel 1990; Ponemon 1992). Low and moderate levels of pressure can provide some benefits, while extreme pressure results in unwanted behaviors on the part of auditors, including premature signoff, omission of audit steps, and under-reporting of hours worked (Alderman and Deitrick 1982; Asare et al. 2000; Kelley and Margheim 1990; Kelley and Seiler 1982; Kermis and Mahapatra 1985; Lightner et al. 1982; Ponemon 1992). This study addresses moderate levels of budget pressure; therefore I expect benefits from the implementation of more stringent time budgets.

These budget constraint benefits can occur via two theoretical routes. First, budget constraints can serve as a goal for the auditor to achieve. Goals that are seen as a challenge result in positive increases in performance (Drach-Zahavy and Erez 2002). Goals only have a positive effect when auditors have the ability to accept the goal. Without this ability, the effects of goals are significantly reduced or possibly non-existent (Drach-Zahavy and Erez 2002; Durham et al. 2000). An alternative route is a time pressure adaptation route. When faced with time pressure, there are three possible responses. Two of these, working faster and filtering information, are adaptive in the sense that they decrease time spent and can provide positive results (Durham et al. 2000; Payne et al. 1993). The final strategy of changing methods, possibly to a simple heuristic method, is maladaptive (Durham et al. 2000; Payne et al. 1993). In order to take

advantage of the adaptive strategies, auditors must have the ability to work faster or to filter the information. I expect auditor ability is already well developed related to financial risks, but suspect it is less developed for business risks. I hypothesize that decision aid use supplements auditor knowledge structures related to business risks and provides a means for auditors to take advantage of the positive effects of a more stringent budget.

I investigate these propositions in two separate but related case-based experiments. One hundred forty-two audit seniors from a Big Four accounting firm that uses an RBA approach participated in the experiments during a firm-sponsored training course. My first experiment dealt with the ability of the auditors to identify both business and financial risks under varied budget pressure. My second experiment focused on how budget constraints and decision aid use affects risk assessments.

In Experiment One, I find that the risks identified by the auditor participants tend to be more accurate when the auditor is identifying financial statement risks compared to business risks. This result is interesting, as one of the main principles of the RBA approach is the use of business risks to better understand the client and effectively audit the client. Failure to identify risks has been suggested as a shortcoming of the RBA method (Weil 2004). My finding suggests that RBA approaches may be limited by auditor ability to identify business risks, supporting recent criticisms of this methodology. I further test the effects of budget constraints on risk identification. I find that time constraints have no effect on risk identification for financial or business risks.

In Experiment Two, I test the effects of budget constraints and decision aid use on risk assessment. I find that financial risk assessments are not affected by budget constraints or by decision aid use. This is likely due to the well-developed knowledge structures related to financial risks, as well as concern for conservatism in identifying financial risks. For business risk assessments, however, I find stringent budget constraints and decision aid use interact to affect accuracy. When auditors had use of a decision aid, providing a more stringent budget constraint led to improved risk assessments.

I also investigate the paths by which budget constraints affect business risk assessments for auditors using a decision aid. Under decision aid use, I find that business risk assessments are improved directly by more stringent budgets, suggesting that goal theory is one route influencing risk assessment performance. However, I do not find that budget constraints are mediated by perceived budget pressure. Under decision aid use, perceived budget pressure does lead to improved business risk assessments, though it is not predicated on budget constraints as expected.

To summarize, the main findings of this study are: (1) audit seniors are better able to identify financial risks compared to business risks; (2) budget constraints do not improve risk identification; and (3) with decision aid use, budget constraints improve performance on business risk assessment.

This study makes several contributions to both theory and practice. First, it informs the audit literature regarding auditor ability to identify risks in the RBA environment. It also informs literature on the positive effects of time budgets, and it

informs the decision aid literature as it relates to risk assessments. I find that the ability of audit seniors to identify business risks is limited, implying that improvements in training or other methods are necessary in order for RBA approaches to be most effective. Finally, this study indicates that more stringent budget constraints can provide positive outcomes when personnel have the ability to act on these goals, suggesting that firms may be able to improve business risk assessments through simple decision aid tools.

The paper will proceed as follows. In Chapter II relevant hypotheses are developed based on an analysis of audit literature and psychology literatures covering goal theory and time constraints. This is followed by a description of the research methodology in Chapter III. Chapter IV provides the results of the data collected for Experiment One and Experiment Two. Finally, Chapter V provides a summarization of the research, its limitations, and conclusions drawn from the results.

CHAPTER II

BACKGROUND AND HYPOTHESES

The purpose of this chapter is to outline the logic and theories underlying my experimental predictions. I contend that auditors are better able to identify certain types of audit risks, specifically, financial risks. Auditors are able to better identify these risks because they have more developed knowledge related to financial risks. Alternatively, I expect that auditors do not have well-developed knowledge for business risk analysis. When auditors lack well-developed knowledge for risk analysis, I propose the use of a decision aid. Under decision aid use, I predict that the motivational aspects of goals and adaptive time pressure strategies improve auditor business risk analysis.

Identification of Financial versus Business Risks

Risk identification is important in the audit planning process, is key to the effectiveness and efficiency of the audit, and is an important factor in carrying out substantive tests (Bedard and Graham 2002). The importance of correctly identifying audit risks is easy to understand because the failure to identify a risk means that no work can be done to control exposure to that risk. An RBA approach stresses the importance of both financial and business risks because business risks can ultimately have an effect on the financials. When auditors do not recognize potential risks, audit failures may result because appropriate actions to mitigate these risks cannot be implemented (i.e. additional audit procedures, additional disclosures, and possibly even dismissing the client). Audit failures leave auditors open to lawsuits and erode the public trust in the profession. Therefore, adequate risk identification is absolutely essential to the

successful completion of the audit. "Despite the importance of risk identification in practice, this task has received little attention in the auditing literature" (Bedard and Graham 2002, 40).

The current study contributes to the audit literature by examining differences in the identification of financial versus business risks in a RBA environment. As discussed in the previous section, the RBA approach focuses not only on financial statement risks that have traditionally been a part of the audit, but also on business risks that deal with the strategic position of the client. By investigating risk identification in the RBA context, I can speak to differences in ability related to financial and business risks. If ability is not as well developed for some risk analyses, then I can begin to address ways to improve auditor performance in these areas.

Risk identification involves bringing together many factors from memory and other information sources, while risk assessment involves only weighting these factors (Bedard and Graham 2002). For this reason, identification of risks is a much more difficult task than risk assessment. Without knowledge structures in place, the identification of risks is extremely difficult or even impossible. Therefore, differences in auditor ability to identify the different types of risks indicate that knowledge is not as well developed for one of the two risk types.

I expect that auditors have differing ability related to the assessment and identification of these two risk types due to more developed knowledge of financial risks compared to business risks. Although RBA stresses the importance of identifying business risks, I believe that auditors will perform significantly better when identifying

financial risks. This is because they have developed the relevant knowledge related to financial risks, but not business risks. There are two reasons for this: better preparation and better guidance.

Auditors have had exposure to financial risks for many years, even at an early stage in their careers, due to their academic preparation. Audit and accounting textbooks and classes generally focus on financial risks. Audit classes cover topics such as financial statement assertions, the audit of account balances, and tests of controls. In other accounting classes, the relationships between the accounts and the financial statements are explained so that auditors can identify unusual fluctuations in accounts. While strategy classes in management are also part of a business curriculum and address areas that would include business risks, accounting students have had significantly more exposure to financial risks through the sheer number of accounting classes required.

Additionally, there is little regulatory guidance in the area of business risk identification. Auditing guides discuss the financial assertions, risks related to each assertion, and how to test these assertions, and they sometimes describe required auditing procedures. Traditional auditing standards do not address strategic business risks directly. Evaluating client strategy in the form of business risks is somewhat an "art," and definitive guidance in this area is not available. With definite rules related to what is expected from the auditor related to the financial risks, and with little guidance on business risks, auditors are more likely to focus on the areas related to the financial statements. For these reasons, auditors would not be expected to have well-developed knowledge structures related to business risks early in their auditing career. Based on

this, I propose that the identification of financial risks will be easier for auditors than the identification of business risks.

H1: Auditors will identify more financial risks than business risks, ceteris paribus.

The purpose of hypothesis H1 is to test expectations about the quality of auditors' knowledge structures. If hypothesis H1 is supported, I conclude that auditors have more well-developed knowledge structures related to financial risks than business risks. Assuming this is true, there are implications related to how improved performance on risk analysis can be achieved for financial risks compared to business risks. The next sections address these implications and offer hypotheses with respect to improving risk analysis.

Time Pressure

Research on the effects of time pressure on auditors is of interest because auditors always work in a time constrained environment in order to meet deadlines set by regulatory agencies, clients, and other stakeholders. Additionally, audit personnel create internal deadlines and budgets in order to ensure they meet external deadlines, as well as manage the efficiency of their jobs. There are two types of time pressure: time limit pressure and time budget pressure. According to DeZoort and Lord (1997), these are related but independent constructs. Previous studies have looked at both types of time pressure and the effect on accountants, generally finding that moderate amounts of time pressure can sometimes be beneficial, while extreme pressure is always detrimental (Asare et al. 2000; Braun 2000; Kelley and Margheim 1990; Kelley and Seiler 1982; Kermis and Mahapatra 1985; Lightner et al. 1982; Marxen 1990; McDaniel 1990;

Ponemon 1992). Extreme time pressure leads to dysfunctional behaviors including improper completion of audit tests, premature sign-off, under-reporting of hours worked, and job stress resulting in employee turnover (Asare et al. 2000; Braun 2000; Kelley and Margheim 1990; Kelley and Seiler 1982; Kermis and Mahapatra 1985; Lightner et al. 1982; Marxen 1990; McDaniel 1990; Ponemon 1992).

The extant literature finds that time pressure motivates auditors so that performance is a concave function of increased pressure. This is known as the "inverted-U" theory (DeZoort and Lord 1997)[4]. The basic finding is that small and moderate levels of pressure tend to create increases in performance. At some point, the pressure becomes great enough so that it causes dysfunctional behaviors resulting in decreased performance. In the current study, I do not study pressures that are extreme or past the inflection point for peak performance. My objective is to focus on moderate amounts of budget pressure.

In this study, I address budget constraints within a RBA environment. I ask auditors to make risk analysis decisions under differing budget constraints. My research looks at how these estimates of future constraints influence the current tasks of audit risk analysis. Limited audit research has looked at how constraints on resources in the future affect the decisions made by auditors in the present (Low 2004). One possibility is that knowledge of future limitations on a resource will change current decisions in a negative manner. Predecisional distortion theory would predict that if auditors have a specified number of budgeted hours in mind, this cognition affects their subsequent decisions

[4] This is also known as the Yerkes-Dodson effect.

(Russo et al. 1996; Russo et al. 1998; Russo et al. 2000; Wilks 2002). When budget constraints are extreme, I would expect that auditor cognitions about the risks would be changed. Prior work has shown that extreme pressures often lead to dysfunctional behaviors, and the changing of risk assessments based on budget pressures could be detrimental to the audit (DeZoort and Lord 1997; Kelley and Margheim 1990; Kelley and Seiler 1982; Kermis and Mahapatra 1985; Lightner et al. 1982; Marxen 1990; McDaniel 1990; Ponemon 1992). The current study however, addresses moderate budget constraints. Given this, I expect that auditors will not feel extreme levels of pressure that could drive them to make poor decisions. Instead, I expect that budget pressure will have a motivating effect.

The positive effects of budgets can occur via two possible routes. The first route is through the motivational effects of accepting a more difficult goal. The second route is the elicitation of more effective task strategies such as working faster or filtering out less relevant information. The following sections lay out the theory for each of these routes and hypothesize relationships applicable to the theory.

Budget Constraints as a Goal

Goals in the form of budget constraints can motivate auditors and lead to enhanced performance. Performance on work tasks is an increasing function of the difficulty of an individual's goals (Durham et al. 2000; Latham 2000; Locke 2000; Locke and Latham 2002). In general, more difficult goals lead to greater effort and improved performance. Peters et al. (1984) find that time pressure and budget constraints affect performance through their influence on goal difficulty. In other words, difficult goals

mediate the effects of time pressure on performance (Peters et al. 1984). Their findings related to time pressure are consistent with other work in the psychology literature showing that a more difficult goal often leads to increased performance.

Goals are energizing (Locke and Latham 2002). This means that more difficult goals will lead to greater effort than less difficult goals (Locke and Latham 2002). Simply by providing a more difficult goal, individuals are encouraged to put forth more effort toward the task at hand. Therefore, providing auditor participants with a difficult goal of meeting more stringent budget constraints will likely lead to greater effort on the part of these auditors. As the auditors put forth more effort on the task, judgments about audit risks should improve.

Next, goals affect persistence and intensity (Locke and Latham 2002). This means more difficult goals will usually result in effort over a longer period of time and/or greater effort intensity (Peters et al. 1984). In the current situation, the participants are given different budgets in which they are expected to complete the audit. The budget limits the ability to expend effort over a longer period of time; therefore the expectation is that participants in this study will show greater effort intensity. Through increased attention to the task at hand, auditors with a more difficult budget constraint will perform better than other auditors who are given a less difficult budget constraint.

Finally, goals lead to discovery of task-relevant strategies (Locke and Latham 2002). The goal literature has found that goals affect performance indirectly through arousal, discovery, and task-relevant strategies (Locke and Latham 2002). This means that when an individual has previous knowledge he or she will apply it to the situation.

In cases where the individual does not have direct experience, he or she will develop a plan and will draw on prior skill sets to try to develop appropriate strategies for the current task.

The energizing effects of providing a more difficult goal in the form of budget constraints should lead to greater motivation on the part of auditors. Given a more difficult goal, the intensity of effort is increased as well as the discovery of relevant strategies. The combination of these factors should ultimately result in better decisions related to audit risks.

Time Pressure and Coping Strategies

When auditors experience time pressure they can react in a variety of ways. It has been suggested that there are three responses to time pressure: (1) working faster, (2) filtering information, and (3) using "simple, non-linear" decision strategies (Durham et al. 2000; Payne et al. 1993). While the first two strategies are effective, the third strategy is not. Working faster is not an appropriate strategy in the current context because the budget pressure occurs in the future (although auditors may plan to work faster during the actual audit of these risk areas). Auditors could respond to the increased budget pressure in a less effective manner by choosing a heuristic decision strategy. This change in strategy to a "simple, non-linear method" is even more likely in certain instances. For example, when tasks are overly complex or auditors do not have the required ability, they will be more likely to use the ineffective strategy[5] (Payne et al. 1993).

[5] The assessment of audit risks is a complex audit task. In the current study, however, task complexity is held constant within each experiment, therefore task complexity effects are not examined within the context of the current study.

Instead, a filtering technique where the auditor addresses the most relevant information related risks is the only effective response in the context of the audit risk decisions addressed in this study. Filtration is an effective strategy because it forces auditors to be more judicious about the information that they consider (Ariely and Zakay 2001). When irrelevant information is considered, judgments tend to be less accurate due to the dilution effect[6] (Nisbett et al. 1981). Prior studies have found that time pressure ameliorates the effects of irrelevant information because auditors filter it out (McDaniel 1990, Glover 1997, Payne et al. 1988). By selecting the most relevant information, auditors are more likely to make better decisions regarding audit risks.

Budget Constraints and Risk Identification

In the preceding section, I predict that auditors will identify more financial risks than business risks because they have greater knowledge structures related to financial risks. Audit risks should be identified regardless of the time budget allocations, because a failure to identify risks means they cannot be controlled. Auditors understand the importance of risk identification; therefore I expect that limits on risk identification stem from ability and not from externally imposed factors. In other words, auditors cannot identify risks if they do not have ability; however, they will identify all risks that they are capable of recognizing because of the implications for the audit. Therefore, I do not expect budget constraints to affect identification, although this expectation is not known. To test this, I predict the following, stated in the null form:

[6] Usually irrelevant information has a moderating effect on judgments so that decisions make with irrelevant information are less extreme both in a positive and negative direction. Therefore, under dilution theory, decisions will tend toward a middle ground when irrelevant information is considered.

H2: Budget constraints do not affect risk identification accuracy for financial risks or business risks. [7]

Budget Constraints and Risk Assessment

As a task becomes more complex, the individual completing the task will need more ability in order to complete it successfully. Complex tasks are those that have more components or informational cues and require more coordination of the separate pieces that make up the overall task (Bonner 1994). The processing of client information and the assessment of audit risks are very complex tasks because there are numerous cues, and these cues must be interpreted in combination with one another. Therefore, auditor ability is an important consideration when addressing risk assessment.

Ability moderates the effect of goals. In order for an individual, like an auditor, to act on a specific goal, he must have the ability to do so. Without the ability to act in a manner to accomplish the goal, the goal will be perceived as a threat. When goals are perceived to be a threat, performance decreases (Drach-Zahavy and Erez 2002). In fact, goals that are too difficult due to lack of ability will often have the effect of the individual simply "giving up" (Durham et al. 2000). Since I expect auditors to have less ability with respect to business risks, goals related to these risks will be viewed as a threat unless auditor ability can be improved.

Ability also influences the selection of coping strategies used to deal with perceived time pressure. In order to successfully make determinations about audit risks

[7] Producing a number of risks is not as important as producing a listing of risks that accurately measures the audit risks to the client, both financial and business. In order to benchmark the accuracy of the risks, the listing prepared by participants in the study is compared to those of partner experts.

under time pressure, auditors must have cognitive structures in place that will allow them to effectively filter information as a coping strategy. While I predict that auditors have these cognitive structures for financial risks, I do not expect them to be in place for business risks. Cognitive load occurs when complex tasks, such as risk assessment, are performed in the absence of the appropriate cognitive structures (Mousavi et al. 1995). Based on the premise that auditors have less ability related to business risks, I expect business risk assessment to produce significant cognitive load, negating information filtering as a beneficial coping strategy -- unless auditor ability can be improved.

Assuming that knowledge structures are well developed for financial risks as indicated by hypothesis H1, it can be inferred that auditors have ability related to financial risks. With this ability, I expect that goals should have a positive effect on financial risk assessments. Additionally, this would imply that when faced with budget pressure, auditors act in an adaptive manner (e.g. filtration), rather than a non-adaptive one. Therefore financial risk assessments are expected to be improved when auditors are given more stringent budget constraints.

H3a: More stringent budget constraints increase the accuracy of financial risk assessments.

I expect that auditor ability related to business risk assessments is not as well developed as financial risk ability. For this reason, budget constraints are unlikely to have a positive effect on business risk assessments and could possibly even have a negative effect (Drach-Zahavy and Erez 2002). Since business risks are key to the RBA

approach, finding ways to improve auditor ability in this area can make risk based audits much more effective. I now discuss one way that auditor ability can be enhanced.

Enhancing Ability through a Decision Aid

Many audit studies have found that decision aids improve accounting judgments in a variety of tasks (Ashton 1974; Ashton and Brown 1980; Eining et al. 1997; Glover et al. 1997; Rose and Wolfe 2000; Whitecotton and Butler 1998). Prior research has also shown that some decision aids can decrease cognitive load and aid performance (Rose and Wolfe 2000). Decision aids offer structure to the decision process, and structure has been shown in the psychology literature to improve decision-making (MacGregor et al. 1988; Slovic et al. 1977). The use of a structured task ensures that people are less likely to become overwhelmed and rely on simple heuristics to make decisions (Armstrong et al. 1975). Therefore, the use of a non-deterministic decision aid may substitute for the lack of cognitive structures to organize decisions about audit risks.

The structuring method proposed in this study is based on the multi-attribute utility theory (MAUT). This method calls for complex decisions to be addressed as separate parts or attributes. These separate attributes represent the values that are important to the overall decision. MAUT formally describes the decision evaluation as:

$$MAU = \Sigma\, w_i u_{ij} \qquad (1)$$

Where

w= weight of the i^{th} attribute

u= utility of the attribute

Once the separate attributes have been assessed and weighted, the individual sums of all of the attributes together determine total utility and identify the best alternative (Slovic et al. 1977). Use of a decision process based on MAUT has been found to help people focus on important issues, feel more comfortable with their decisions, and provide more thoughtful and higher quality decisions (Ariely and Zakay 2001; Arvai et al. 2001).

In order to facilitate improved risk assessments, I develop a simple, non-deterministic decision aid based on MAUT as well as literature from two Big Five auditing guides[8]. This decision aid requires the auditors to assess each risk on two relevant attributes. The first is the significance or magnitude of the risk. The second is the likelihood of that risk to occur. Auditors plot the evaluations of each risk attribute on a grid that approximates the summation suggested by MAUT[9] (see Appendix M). By breaking the risk assessment down into two separate attributes that have relevance to the current risk decision, cognitive load is reduced and the auditors can better evaluate the overall risk.

When auditors use a decision aid to reduce cognitive load and structure their decisions related to business risks, then goal theory predicts that more difficult goals produce better performance. Also, with increased ability, when auditors perceive more budget pressure, a beneficial adaptation should lead to improved performance. With a decision aid to proxy for ability, I expect budget constraints to produce better business

[8] By non-deterministic, I mean that the decision aid does not offer a final solution. The decision aid simply provides the structure in which the auditor makes the decision.

[9] Plotting the risk attributes on a grid approximates the summation suggested by theory only if the attributes are of equal weight. My review of the audit documentation of two Big Five firms indicates consideration of these attributes. Both firms suggest picturing these attributes on two axes. One firm required formal evaluation on this type of grid. Based on these graphic depictions and reading of the firm materials, I surmise that these attributes should be weighted equally.

risk assessments through goal induced motivation and/or a positive adaptation to perceived time pressure. I propose the following relationship[10]:

H3b: Decision aid use combined with a more stringent budget increases the accuracy of business risk assessments.

How Performance is Improved

When auditors have relevant knowledge related to financial risks, budget constraints are expected to improve performance (H3a). Also, when auditors have a decision aid, business risk assessments related to the audit are expected to be more accurate (H3b). In the process of developing these predictions, I introduce two possible routes to explain task improvement. The first is goal theory that predicts the energizing and motivating aspects of a more difficult goal lead to improved performance. The second is a time pressure adaptation perspective. As an individual perceives more budget pressure (regardless of whether there is actually increased pressure), they can react adaptively by working faster or filtering information.

The test of hypotheses H3a and H3b determines if the stringent budget interacts with auditor ability to produce improved performance. It does not allow me to determine, however, whether the budget constraint directly affects performance or if it affects performance by inducing budget pressure. I make predictions about the effects of these two cognitive routes only when auditors have ability (i.e. when the auditor is assessing

[10] It can be argued that risk identification would also be improved by use of a decision aid and that this relationship should be hypothesized for risk identification also. Risk identification does not easily lend itself to use of a decision aid because any such aid would seemingly have to list out possible risks; therefore, this would defeat the purpose of testing risk identification. Since risk identification has received little attention in the literature to date (Bedard and Graham 2002), this study is meant to be exploratory in the area of risk identification.

financial risks and when the auditor has a decision aid to help assess business risks). Budget constraints could be partially or fully mediated by budget pressure perceptions. Another alternative is that both of these routes improve performance independently. Prior research has shown that both the goal route and time pressure route can lead to improved performance. Based on this, I predict that auditor performance is improved via both routes. I predict:

H4a: Stringent time constraints improve financial risk assessments in two ways: (a) directly through a goal effect, and (b) indirectly through perceived budget pressure.

H4b: When auditors use a decision aid, stringent time constraints improve business risk assessments in two ways: (a) directly through a goal effect, and (b) indirectly through perceived budget pressure.

Summary

The preceding sections outlined the basis for my experimental hypotheses. I contend that auditors are better able to identify financial risks for the audit than business risks. Auditors are able to better identify these risks because they have more developed knowledge related to financial risks due to more regulatory guidance and more coverage during their academic careers. Since business risks are an important part of the RBA approach, the inability to perform risk analysis related to these types of risks is a limitation worthy of study. Since I believe that auditors lack ability related to business risk analysis, I advocate the use of a non-deterministic decision aid to substitute for ability. When auditors have adequate ability, I predict that the motivational aspects of

goals and the use of adaptive time pressure strategies are the cognitive methods by which performance is improved.

CHAPTER III

METHOD

Participants

Participants were 142 experienced audit seniors employed by one Big Four accounting firm. This firm uses an RBA approach, but does not use a decision aid to structure risk assessments. The participants were enrolled in a national firm training course for auditors at this experience level. Within the RBA approach, auditors are involved in the risk identification and audit test design stages at an early part of their careers (Bell et al. 1997). As a result, a senior has some experience with risk analysis procedures. Additionally, audit seniors bear the bulk of the responsibility for meeting the audit budget; therefore, these auditors were appropriate subjects for this study (Houston 1999; Kelley and Seiler 1982). The use of one firm is important as it allows me to hold constant the training and methodology used at the firm that might otherwise add error variance to my measures. Approximately 850 auditors attended this national training, of which 150 were assigned to participate in this study. The experiment was designed for the one-hour time allotted during the training by the participating firm. Two partners at the firm reviewed the materials to ensure they were appropriate and that the task could be completed within the allotted time.

Task

The experimental tasks involved reading planning materials for a hypothetical audit client[11]. The materials consisted of information about the client industry including excerpts from a trade journal. In addition, there was a brief description of the company similar to what would be included in the Management, Discussion and Analysis (MD&A) section of a form 10-K. Finally, financial statements were provided. I used a manufacturing client for the hypothetical company. The advantage to using a manufacturing client was that experimental participants were familiar with this type of client due to at least some exposure during their schooling. In addition, prior studies have found that when an auditor does not have specific industry knowledge, they usually rely on their knowledge of a familiar industry, such as the manufacturing industry (Taylor 2002).

My hypotheses are tested in two separate but related experiments. For Experiment One, the auditors are asked to provide a listing of audit risks for the manager on the engagement. After listing the audit risks, the auditors made risk assessments and assigned audit hours. [12] For Experiment Two, auditors were provided with a listing of audit risks that had been prepared by two partners working for this particular Big Four firm. These auditors were asked to read the materials and provide a risk assessment for each risk listed as well as estimate the hours it would take to audit that risk.

[11] The planning materials including the financial statements and MD&A were based on a small manufacturing company that is publicly traded on the NASDAQ. The information is publicly available through the Securities Exchange Commission annual and quarterly filings.
[12] A risk assessment is the prioritization of audit risks as high, medium or low.

Design and Procedures

Experiment One

Experiment One investigated the effects of budget constraints on risk identification in a RBA environment. In the introduction of the experimental materials, the total budgeted hours were set equal to either 450 (stringent budget constraints condition) or 600 (non-stringent time constraints condition) hours. Auditors read experimental materials presented in a booklet titled "Company Information." Finally, the auditors provided a listing of risks that should be considered for the audit. For each risk identified, the auditor also provided a risk assessment and an initial estimate of hours to be assigned to audit the risk.

A schematic of the experimental procedures described below for Experiment One can be found in Figure 1.

1. An administrator was assigned to each training room. The administrator read a short script explaining the experiment (Appendix A). The administrator then passed out manila envelopes containing the experimental materials. The manila envelopes were randomized, such that each auditor had equal chance to receive either of the two treatments[13].
2. Within each envelope were several stapled packets and the information sheet required by the institutional review board (IRB). The instructions asked that the packets be completed in a specified order. The first page was an instruction

[13] In addition to having an equal chance of receiving either of these two treatments, materials from experiment one and two were randomly assigned to each room. Therefore, all subjects had an equal chance of receiving any of the total of six treatments across the two experiments.

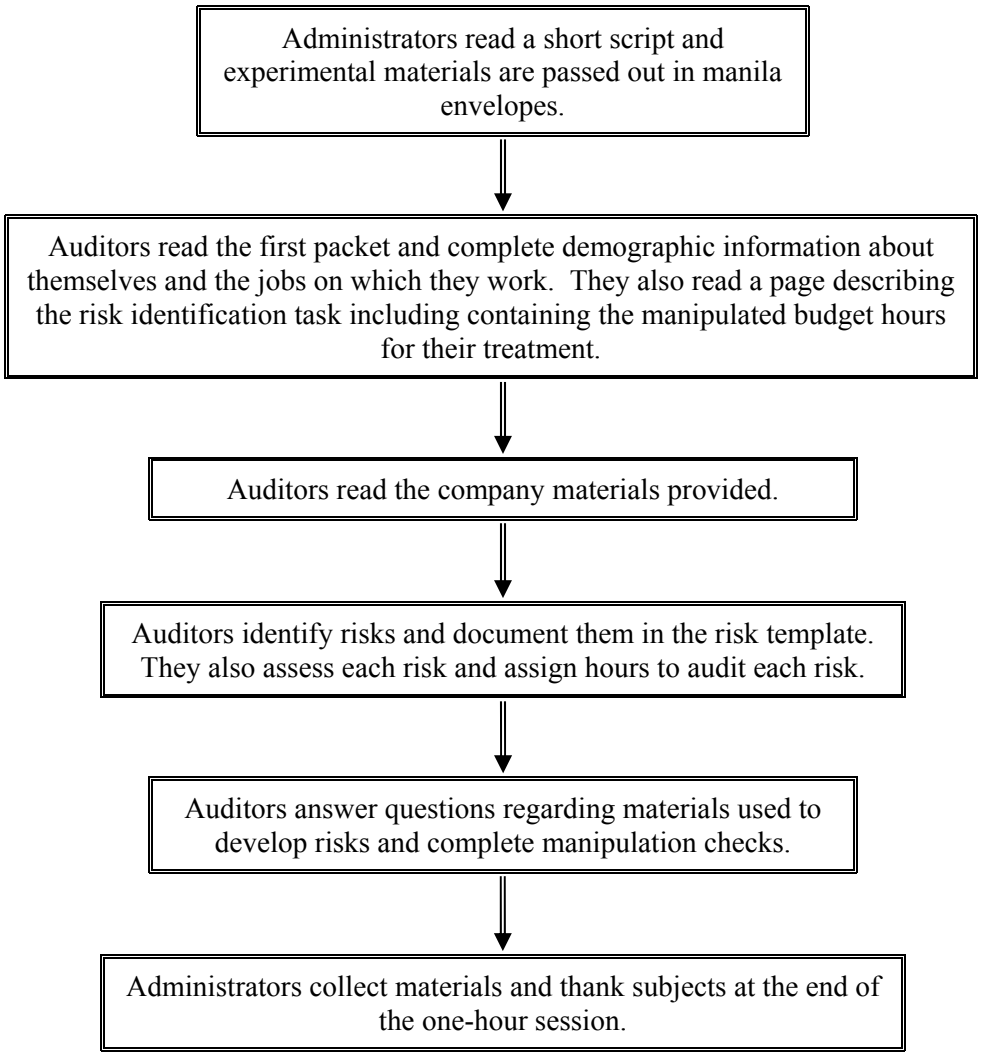
sheet detailing the completion of the experiment and describing all of the packets contained in the manila envelope (Appendix B).

3. The first packet contained a demographic questionnaire (Appendix C) and a page describing the experimental task followed (Appendix D). This required the auditors to read the second packet containing information about the hypothetical client and industry (Appendix E and Appendix F) and the third packet containing the risk identification template (Appendix G) on which the auditor listed the risks that they identified. In addition to identifying the risks, the auditor also provided a risk assessment on a seven-point Lickert scale and wrote the number of hours that they would budget for that audit area. Auditors were instructed to identify and document risks based upon the company information provided and to view this information while identifying and assessing audit risks.
4. Auditors reviewed the company information and documented the relevant audit risks in the provided template, including a reconciliation of the total estimated hours in the audit (Appendix H).
5. A short questionnaire, the last step in the experiment, asked the auditors how useful the various forms of company information were in helping to identify and assess the risks and included manipulation check questions (Appendix I).
6. Once all of the information was completed, the auditors placed their materials in the large manila envelopes and returned them to the room administrator. When

all of the envelopes were collected, the auditors were thanked for their time and the experiment was ended.

Figure 1.

Experiment One Procedures



Experiment Two

Experiment Two was a 2 x 2 between subjects design that manipulated budget constraints (stringent vs. non-stringent) and decision aid use (decision aid vs. no decision aid). Budget constraints were manipulated in the introduction of the case scenario so that the total budgeted hours were set equal to either 450 (stringent budget constraints condition) or 600 (non stringent budget constraints condition) hours.

Decision aid use was manipulated by providing a decision aid or asking auditors to make unaided decisions. In the decision aid treatments, the auditor was instructed to prioritize the risks on two axes of a grid. One axis represented the attribute "significance of the risk" (e.g. materiality), and the other represented the attribute "likelihood of occurrence"[14] (Appendix N). Auditors assessed each risk on a continuum of low-to-high for each of these attributes. After assessing each attribute on the related axis, the auditor looked for the intersection of these two points to determine the overall risk assessment. Auditors were instructed that risks that were high on both significance and likelihood should be classified as a 6 or 7 on the Lickert scale. If the risks were low on both significance and likelihood, they were classified as a 1 or 2 on the Lickert scale. A combination of high and low produced a medium risk, and was classified as 3, 4, or 5 on the Lickert scale.

In the no decision aid treatments, the auditor was simply asked to determine the severity of the risk on a seven-point Lickert scale. The auditors circled a judgmental

[14] These constructs were noted during review of audit handbooks of two Big Five audit firms.

evaluation of their risk assessment on the risk template that represented their overall assessment of that particular risk.

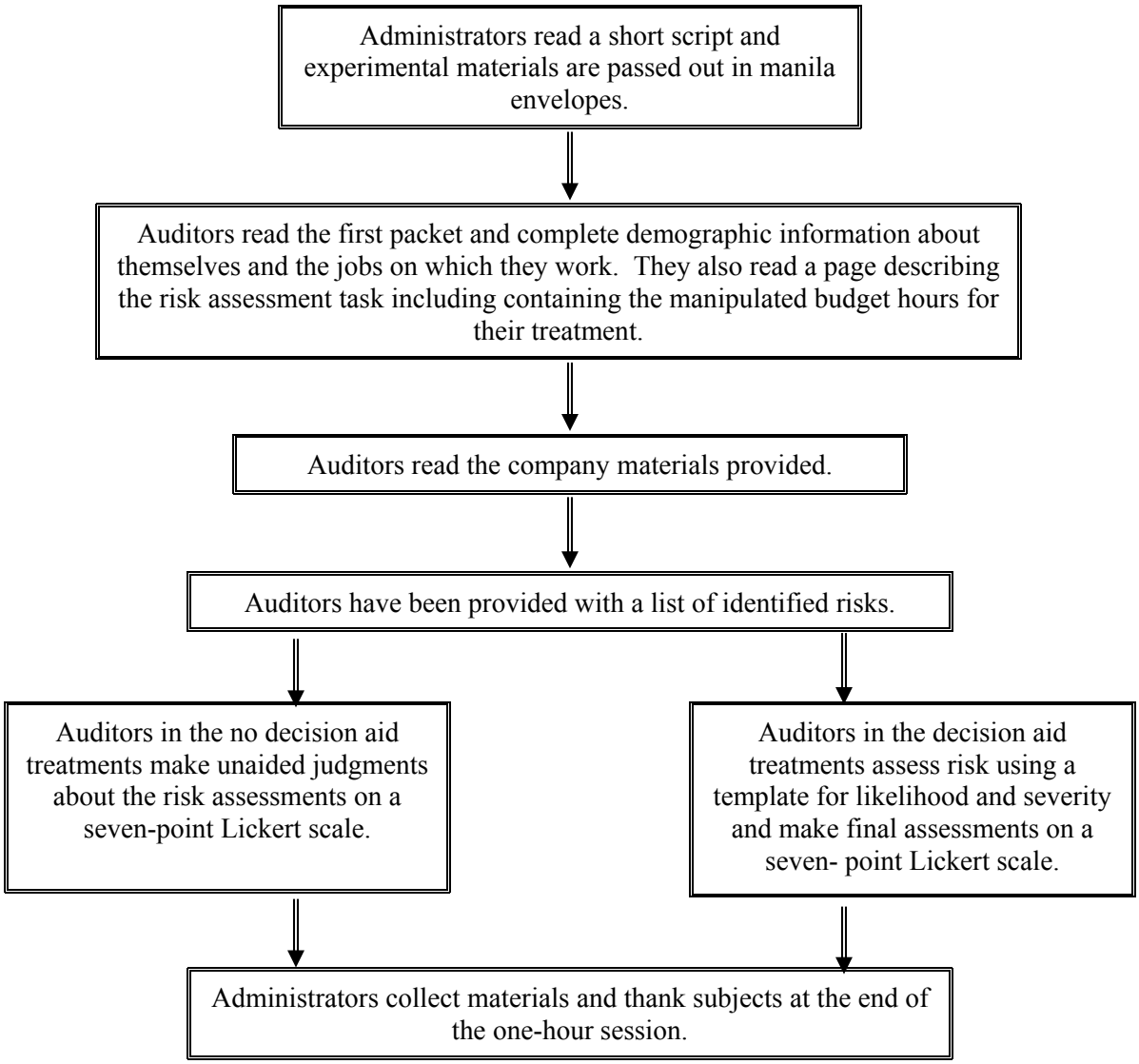
In the Experiment Two materials, the risk areas were already identified and typed into a template for the auditor to review. The identified risks were provided by two partners (hereafter "partner experts") working at the participating Big Four firm who reviewed the same materials as the experimental participants. The two partner experts agreed to a list of eleven financial and business risks for the hypothetical company and also provided ratings of the importance of each risk.

Providing the list of risks to the auditor participants in the same order provides opportunity for order effects to skew my results. In order to address this threat to the internal validity of my results, I randomized the list of risk into different orders, so that no auditors in the same treatment would have the same risk ordering. It is important to note that in Experiment Two auditors did not identify risks; instead they provided the risk assessments on a seven-point Lickert scale.

A schematic of the experimental procedures for Experiment Two can be found in Figure 2.

Figure 2.

Experiment Two Procedures



1. An administrator was assigned to each training room. The administrator read a short script explaining the experiment (Appendix A). The administrator then passed out manila envelopes containing the experimental materials. The manila envelopes were randomized, such that each auditor has equal chance to receive any treatment.[15]
2. Within each envelope were several stapled packets of paper and an Information Sheet required by the IRB. The first page was an instruction sheet detailing the completion of the experiment and the materials included (Appendix J for Decision Aid treatments and Appendix K for No Decision Aid treatments).
3. The first packet included a demographic questionnaire (Appendix C). Once this was completed, the following page included a description of the experimental task including the manipulated budget hours (Appendix L). The task involved reviewing the risk listing (Appendix M) and the company and industry information packet (Appendix E and Appendix F) provided in the manila envelope. The risks listed were provided by partner experts. The list of risks was in a template that required circling a risk assessment and providing estimated budget hours for each risk. The risk assessments were made on a seven-point Lickert scale ranging from Very Low to Very High. The budgeted hours were a written estimate of hours provided by the auditor participant for each risk area.

[15] In addition to having an equal chance of receiving any of these four treatments, materials from experiment one and two were randomly assigned to each room. Therefore, all subjects had an equal chance of receiving any of the total of six treatments across the two experiments.

4. Half of the participants in this experiment received treatments that involved decision aid use as part of the risk assessment decision. For these auditors there were additional steps in their instructions that asked them to use a decision aid to classify the risks on the seven-point Lickert scale. The decision aid and instructions were included with the materials for these treatments (Appendix N).
5. A short questionnaire followed with instructions to complete it last. It asked the auditors how useful the various forms of company information were in helping to identify and assess the risks and included manipulation check questions. (Appendix I).
6. Once all of the information was completed, the auditors placed the materials in the large manila envelopes and returned them to the room administrator. When all of the envelopes were collected, the auditors were thanked for their time and the experiment was ended.

Variables Operationalized, Functional Relationships and Statistical Tests

My first hypothesis tests for differences in auditor ability to identify financial risks versus business risks. To formally test hypothesis H1, I performed a Z test for equality of population proportions. My two proportions included the proportion of correctly identified risks for both financial and business risks. This test allows me to compare two binomial proportions. The statistic for this test was computed using a Microsoft Excel spreadsheet for the following equation (Ott and Longnecker 2001):

$$Z = \frac{(\pi_{financial} - \pi_{business})}{\sqrt{((\pi_{financial}(1-\pi_{financial})/n_{financial})+(\pi_{business}(1-\pi_{business})/n_{business}))}} \quad (2)$$

where

$\pi_{financial}$= the sample proportion of financial risks identified

$\pi_{business}$= the sample proportion of business risks identified

$n_{financial}$= the sample size

$n_{business}$= the sample size

The second hypothesis tests for differences in the proportion of risks correctly identified under stringent budget constraints compared to less stringent budget constraints. The data collected consisted of the identified audit risks and the demographic information. Auditor participants in Experiment One returned 50 packages. Two of these packages were not completed with actual business or financial risks, giving a total of 48 usable responses.

Responses were coded by the author and one independent coder[16]. Responses were compared to the listing of risks provided by the partner experts. Each of the eleven risks identified by the partners was checked against the list provided by the auditors and coded for inclusion. The number of risks correctly identified by the auditors for both financial and business risks was summed to produce a score for that participant (i.e. a score for financial risks and another score for business risk).[17] This score was scaled by the total number of financial and business risks identified by the partner experts to

[16] The independent coder had two years of public accounting work experience and was therefore familiar with terminology.

[17] A risk was considered "correct" if it matched a risk identified by the partner experts.

produce the "scaled score." The author and independent rater agreed on classification for 89.39% of the items. Differences were resolved through discussion by the author and the coder. The resolved differences were then reviewed by a third individual with 10 years of accounting, auditing and SEC reporting experience and with experience in the industry used in the case study.

Scaled scores for financial and business risks were analyzed in a repeated-measures-ANCOVA (Analysis of Covariance) analyzing risk type, budget constraints, and experience. This model provided a test for hypothesis H2. The functional relationship for this test is as follows:

Score = f (Risk Type, Budget Constraint, Experience) (3)

Where:

Score is the proportion of risks correctly identified by each participant compared to the partner experts.

Risk Type is the designation of the repeated measure for each participant as either the business risks or the financial risks.

Budget Constraint is a binary response variable coded as 1 if the participant was in the 450 hour budget constraint treatment and coded 0 if they were in the 600 hour budget constraint treatment.

Experience is measured in months of experience.

Participants in Experiment Two returned 100 packages. Six packages had to be discarded because the participants were unable to complete the questions. This provided 94 usable responses for analysis. Data collected for Experiment Two was benchmarked

against expert assessments prepared by the two partner experts at the participating firm. Experiment Two provided data to test my third hypothesis and investigates whether a decision aid used in combination with a more stringent goal can improve risk assessments. The difference in responses between the experts and the participants was tested in the following functional relationship using Analysis of Variance (ANOVA) methods:

Difference Measure = f (Budget Constraint, Decision Aid Use, Experience) (4)

Where:

Difference Measure is risk assessment difference which is the difference of the auditor participant and the firm expert assessments for business risks and for financial risks. In my analysis I provide relative, absolute, and squared differences.

Budget Constraint is a binary response variable coded as 1 if the participant was in the 450 hour budget constraint treatment and coded 0 if they were in the 600 hour budget constraint treatment (manipulated variable).

Decision Aid Use is a binary response variable coded "1" when the decision aid was used and "0" when it was not (manipulated variable).

Experience is measured in months of experience.

The final set of hypotheses tests the routes by which performance on a business risk assessment may be improved. These relationships are tested via path analysis. Path analysis predicts more than one dependent variable and is also concerned with the

ordering of the variables. Path coefficients are estimated using multiple regression and estimating the parameters for each dependent variable (Klem 2001).

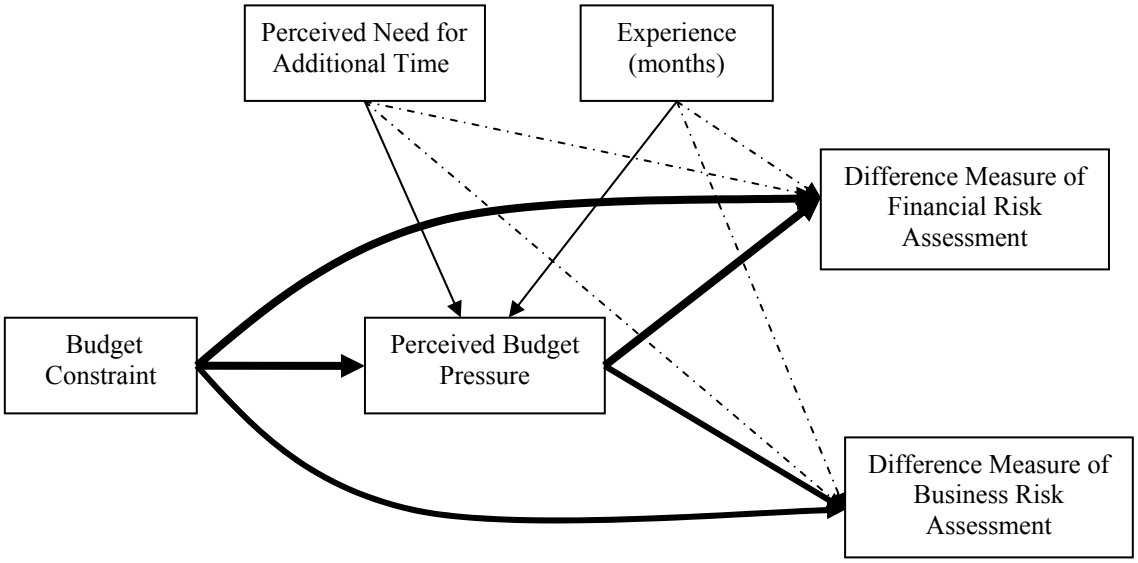
In the path model used for this study, there are two dependent variables (See Figure 3). First, I predict Perceived Budget Pressure. Next, I predict the difference measure for both the financial and business risk assessments. I include experience and perceived need for additional time as covariates. I expect the Budget Constraint and Perceived Budget Pressure variables will predict my business risk difference measures. These paths are hypothesized. Additional paths in the model are tested, but I do not formally hypothesize these paths. Refer to Figure 3 for a schematic of these relationships.

Manipulation Checks

In order to assess whether the auditor participants understood the parameters of the experiment, participants were asked about the hours allocated to them for the budget. They were also asked how many hours the manager said that the previous auditors used for the audit. Six of the auditor participants did not answer these questions correctly. Dropping them from the analysis does not change results; therefore they are left in the sample.

Figure 3.

Proposed Path Analysis Model



Dashed lines represent relationships tested for mediation. These relationships are not predicted.
Bold solid lines represent hypothesized relationships.
Thin solid lines represent expected relationships that are not formally hypothesized.

CHAPTER IV

RESULTS

Two experiments were performed to test the experimental hypotheses. Experiment One explored differences in auditor ability to identify financial versus business risks for the audit. Experiment Two investigated the use of goals in the form of budget constraints to improve auditor performance related to risk assessments. The results of each experiment follow.

Experiment One

Descriptive statistics showed that business risks identified by the partner experts were much less likely to be identified by the audit seniors regardless of months of experience or budget constraints. On average, audit seniors identified only about 16 percent of the business risks predetermined by the partner experts, and no participant identified all of the business risks. In fact, the largest number of risks identified was 2 of the 5 risks, and only 10 audit seniors performed this well. Nineteen of the audit seniors did not correctly identify any business risks at all. Audit seniors identified, on average, 59 percent of the financial statement risks, and 23 percent of the auditors (11of 48) identified either 5 or 6 of the 6 financial risks. Only one participant was unable to correctly identify any of the financial risks. The percentage correctly identified for each risk is shown in Table 2. Hypothesis H1 states that auditors will identify more financial risks than business risks, ceteris paribus. These descriptive statistics support hypothesis H1, indicating that the financial statement risk identification processes are much better

developed than those for business risk identification. These descriptive statistics, however, do not provide a formal test.

Table 2.

Percentage of Audit Seniors Correctly Identifying Each Risk

Risk Name	Percent	Risk Type
The Company's environmental policies and procedures do not adequately prevent environmental issues.	37.5	Business
Insufficient R&D spending resulting in declining product performance and acceptability.	33.3	Business
Inability to purchase necessary components of inventory from suppliers.	8.3	Business
Technical support services are inadequate to ensure customer satisfaction.	2.1	Business
Compensation insufficient to retain competent personnel.	0.0	Business
Inadequate inventory reserves due to obsolescence and declining market conditions.	87.5	Financial
Collectibility of receivables due to insufficient credit extension policies to new and existing customers.	75.0	Financial
Inadequate policies and procedures over deferred revenue resulting in misstated sales.	75.0	Financial
Inadequate warranty reserves established for products sold under warranty.	52.1	Financial
Inaccurate valuation of investments.	47.9	Financial
Significant profits will not be earned to recover investment in property, plant & equipment.	16.7	Financial

To formally test hypothesis H1, I performed a Z test for equality of population proportions (Ott and Longnecker 2001)[18]. I included the proportions of correctly identified risks for both business and financial statement risks. The Z-score was -4.82; therefore, I reject the null hypothesis that these two population proportions are equal. In support of hypothesis H1, I conclude that the proportion of financial statement risks identified is significantly greater than the proportion of business risks identified.[19] The results related to hypothesis H1 indicate that audit seniors are better able to identify financial risks than business risks. The RBA approach relies heavily on identification of both financial and business risks. Finding that business risk identification is not as well developed implies that the RBA approach may not achieve its theoretical potential. Firms wanting to use this type of audit approach should focus on ways to improve business risk identification skills in order to ensure an effective audit.

My second hypothesis, H2, predicts that budget constraints will not affect auditor's identification of financial risks or business risks. To test this hypothesis, scaled scores[20] were analyzed in a "repeated measures" ANCOVA where risk type (i.e. financial or business) was a within-subjects factor and budget constraints was a between-subjects factor. Experience was included as a covariate. The results of the ANCOVA test are shown in Table 3. Hypothesis H2 states that budget constraints do not affect risk

[18] Results of this test are not tabulated.
[19] The ANCOVA analysis shown in Table 3 also supports H2 showing that senior auditors are generally better at identifying financial risks. The model shows that risk type performs differently in the model between financial and business risks as a within-subjects factor. This coupled with the descriptive statistics and the formal Z-test of population proportions indicates differences in the ability of auditors to identify these two different types of risks.
[20] The total risks identified for financial risks were scaled by the total possible as listed by the partner experts in order to produce a ratio of correct responses (i.e. if there were 2 correct of the 6 possible, the scaled score was .334). This same process was done for the business risks to produce the scaled scores.

identification accuracy. Based on the analysis, I cannot reject hypothesis H2; the budget constraint variable is not significant in the model.

This finding indicates that identification of risks is a task limited by factors other than budget constraints. I conclude that audit risks are identified regardless of the time budget allocations, because a failure to identify risks has serious implications and can lead to an ineffective audit. The importance of risk identification is understood by auditors in a litigious, post-Enron environment. Knowing that audits are under increased scrutiny and that audit standards primarily address financial risks, auditors are much more likely to focus on the identification of financial risks. My findings suggest that constraints such as budgeted hours do not affect risk identification. Instead, it appears that risk identification is limited primarily by auditor ability.

Experiment Two

In Experiment Two, I addressed risk assessment for both business and financial risks. I hypothesize that goals, in the form of budget constraints, and decision aid use will affect the accuracy of the risk assessments. Specifically, I predict that when auditors have the requisite ability, more stringent budget constraints actually improve auditor performance for business risks. To test for this, I performed an ANOVA for my difference measures of both financial and business risk assessment. [21]

[21] As discussed in the method section, accuracy measures are calculated using relative, absolute, and squared differences.

Table 3.

Test of Budget Constraints and Experience as Predictors of Accuracy when Compared to Partner-Experts

Panel A: Multivariate Tests using Pillai's Trace[22]

Variable	Value	DF	F	P
Risk Type	.179	1	9.844	.003
Risk Type * Budget Constraint	.000	1	0.009	.924
Risk Type * Experience	.031	1	1.444	.236

Panel B: Tests of Within-Subjects Contrasts

Variable	DF	F	P
Risk Type	1	9.844	.003
Risk Type * Budget Constraint	1	0.009	.924
Risk Type * Experience	1	1.444	.236
Error(risk)	45		

Panel C: Tests of Between-Subjects Effects

Variable	DF	F	P
Intercept	1	36.796	0.000
Budget Constraint	1	0.007	0.935
Experience	1	2.093	0.155
Error	45		

Table 3 Variables defined:
Risk Type is a repeated measure for each auditor. The first measure is the proportion of business risks identified by the participant that agree to the partner experts and the second measure is the proportion of financial risks identified by the auditor participant that agree to the partner experts.
Budget constraint is a binary response variable coded as 1 if the auditor was in the 450 hour treatment and coded 0 if in the 600 hour treatment.
Experience is a continuous variable measuring months of experience for the auditor.

[22] Results are robust to additional measures including Wilkes' Lamda, Hotelling's Trace, and Roy's Largest Root.

Financial Risks

Cell means and ANOVA results for financial risks are shown in Table 4. Cell means show differences from expert assessments in relative, absolute, and squared values in Panel A. Relative differences related to the financial assessments show that audit seniors are assessing financial risks consistently higher than the partner experts. This indicates the seniors tend to be conservative in their assessments and would rather over-audit a risk than under-audit. Cell means also show that differences appear to be smaller overall when a decision aid is used. Budget constraints appear to make no difference when analyzing the treatment means.

In order to formally test differences in the means, Panel B presents the ANOVA results. The ANOVA for financial risks indicates that there are no differences in risk assessments across treatments at a standard significance level of .05. The results of this test indicate that financial risk assessment is not improved by budget constraints or by decision aid use. Therefore, I conclude that hypothesis H3a, stating that more stringent budget constraints increase the accuracy of financial risk assessments, is not supported.

These results imply that audit seniors are conservative in their assessment of financial risks compared to partner experts. This suggests that without supervision of more experienced auditors, audit seniors will assess risk higher than necessary, theoretically leading to greater audit effort and possibly to expending unneeded resources. If audit seniors view the financial statement risks as their main concern for the audit and want to ensure they have adequately assessed risk in these areas, it is logical that they will be overly conservative when assessing these risks. One interesting

implication of these findings is that although the budget constraint did not improve financial risk assessments, it also did not make assessments any worse as would be implied by the Houston (1999) study. I conclude financial risk assessments are not affected by budget constraints, however, audit seniors appear to be overly conservative in their assessments of these risks.

Business Risks

The cell means and ANOVA analysis for business risks are shown in Table 5. Panel A shows cells means for business risks for relative, absolute and squared differences from the partner expert assessments. The relative differences indicate that audit seniors are consistently assessing business risks as less risky than the partner experts. This is exactly the opposite result from the financial risk assessments. Audit seniors are less conservative in their risk assessments for business risks than financial risks. Cell means also indicate that auditors are more accurate in their business assessments when they use a decision aid and have a stringent budget.

Table 4.

Effects of Decision Aid and Budget Constraints on the Assessment of Financial Risks

Panel A: Cell Means (Std. Dev.)[a]

		Decision Aid Use		
		Decision Aid	No Decision Aid	Treatment Means
Budget Constraint	450 Hour Time Budget	5.500 (4.917) 8.500 (3.490) 18.192 (12.442) n = 26	6.692 (4.671) 9.308 (2.635) 22.539 (10.428) n = 26	6.096 (4.787) 8.904 (3.089) 20.365 (11.576) n = 52
	600 Hour Time Budget	4.905 (5.069) 8.333 (2.244) 18.800 (8.641) n = 21	6.850 (5.932) 9.450 (3.410) 23.550 (13.201) n = 20	5.854 (5.525) 8.878 (2.891) 21.122 (11.219) n = 41
Treatment Means		5.234 (4.940) 8.426 (2.969) 18.468(10.802) n = 47	6.761 (5.195) 9.370 (2.962) 22.978 (11.586) n = 46	

Panel B: ANOVA of Risk Assessment Accuracy for Financial Risks

		F-Value (p)[b]		
	DF	Relative Difference	Absolute Difference	Squared Difference
Intercept	1	123.369 (.000)	807.733 (.000)	309.004 (.000)
Budget Constraint	1	.042 (.838)	.000 (.985)	.119 (.731)
Decision Aid Use	1	2.152 (.146)	2.361 (.128)	3.695 (.058)
Interaction	1	.124 (.726)	.061 (.806)	.007 (.934)

[a] Cell means are differences from expert assessment. Reported in order are relative, absolute, and squared differences.

[b] Two-tailed p-values reported.

Formal tests of the treatments were analyzed in the ANOVA shown in Panel B. The interaction of decision aid use with budget constraints is significant, supporting the conclusions drawn from the cell means. In order to better understand the findings of the interaction and to compare the effects of the four treatment combinations, contrast analysis was performed. This is shown in Panel C. I contrast the stringent budget constraints and decision aid treatment (μ450/DA) with the remaining three treatments (μ450/no DA, μ600/DA, μ600/no DA), assigning weights of 3, -1,-1,and -1 respectively. My results indicate significance at .073, .012, and .033 respectively for relative, absolute, and squared differences. I find that the treatment implementing both the more stringent budget constraint and the decision aid is performing significantly better than the mean of the other three treatments. Hypothesis H3b states that decision aid use combined with a more stringent budget increases the accuracy of business risk assessments. The contrast of budget constraints with the decision aid supports Hypothesis H3b.

Table 5.
Effects of Decision Aid and Budget Constraints
on the Assessment of Business Risks

Panel A: Cell Means (Std. Dev.)[a]

		Decision Aid Use		
		Decision Aid	No Decision Aid	Treatment Means
Budget Constraint	450 Hour Time Budget	-1.960 (3.813) 6.360 (2.325) 12.920 (7.989) n = 25	-3.667 (5.211) 7.512 (3.081) 16.852 (10.985) n = 27	-2.846 (4.629) 6.962 (2.780) 14.962 (9.772) n = 52
	600 Hour Time Budget	-5.667 (5.003) 8.714 (2.194) 21.000 (8.689) n = 21	-2.857 (5.721) 7.238 (2.468) 15.429 (10.028) n = 21	-4.262 (5.495) 7.976 (2.424) 18.214 (9.687) n = 42
Treatment Means		-3.652 (4.729) 7.435 (2.536) 16.609 (9.174) n = 46	-3.313 (5.396) 7.396 (2.804) 16.229 (10.491) n = 48	

Panel B: ANOVA of Risk Assessment Accuracy for Business Risks

		F-Value (p)[b]		
	DF	Relative Difference	Absolute Difference	Squared Difference
Intercept	1	47.329 (.000)	781.863 (.000)	279.535 (.000)
Budget Constraint	1	1.984 (.162)	3.779 (.055)	2.826 (.096)
Decision Aid Use	1	.287 (.593)	.089 (.767)	.171 (.680)
Interaction	1	4.821 (.031)	6.099 (.015)	5.761 (.018)

Panel C: Planned Contrast[c]

		t-value (p) [c]		
	df	Relative Difference	Absolute Difference	Squared Difference
$\mu_{450/DA} < (\mu_{450/no\ DA}+\mu_{600/DA}+\mu_{600/no\ DA})/3$	90	1.815 (.073)	-2.435 (.012)	-2.169 (.033)

[a] Cell means are differences from expert assessment. Reported in order are relative, absolute, and squared differences.
[b] Two-tailed p-values reported.
[c] Contrast weights are 3, -1,-1,-1.

Goal vs. Adaptive Strategy

Both the motivational aspects of goals and the use of adaptive strategies related to time pressure can lead to improved performance. It is an open question which of these two routes actually leads to improved risk assessments for auditors. The ANOVA and contrast analysis shown in Table 5 indicate that there is improvement in performance related to stringent budget constraints and use of a decision aid. Since Hypothesis H3b is supported, it is now appropriate to test Hypothesis H4b in order to understand how this interaction is cognitively motivating the auditors.[23]

Hypothesis H4b states that when auditors use a decision aid, stringent time constraints improve business risk assessments in two ways: (a) directly through a goal effect, and (b) indirectly through perceived budget pressure. I test this hypothesis through path analysis. To analyze the interaction with the decision aid, the data is split on the decision aid variable. Figure 4 panel A shows the path analysis for auditors using the decision aid, and panel B shows the path analysis for auditors not using the decision aid.

As shown in the path model, more stringent budget constraints increased the accuracy of business risk assessment (decreased the difference measure). However, more stringent budget constraints had no effect on perceived budget pressure. These results indicate that goal-induced motivation from stringent budget constraints is improving auditor performance related to business risk assessments. While budget

[23] Results are also shown for hypothesis H4a in Figure 4. Hypothesis H4a states that stringent time constraints improve financial risk assessments in two ways: (a) directly through a goal effect and (b) indirectly through perceived budget pressure, and is dependent upon supporting Hypothesis H3a. Hypothesis H3a was not supported.

constraints do not have the expected effect of increasing budget pressure, increases in perceived budget pressure resulted in improved business risk assessments as predicted. This indicates that auditors did use a beneficial, adaptive strategy to perceived budget pressure. Overall, budget constraints enhanced performance via a goal induced motivation route, but not via budget pressure route; therefore, I find partial support for Hypothesis H4b.

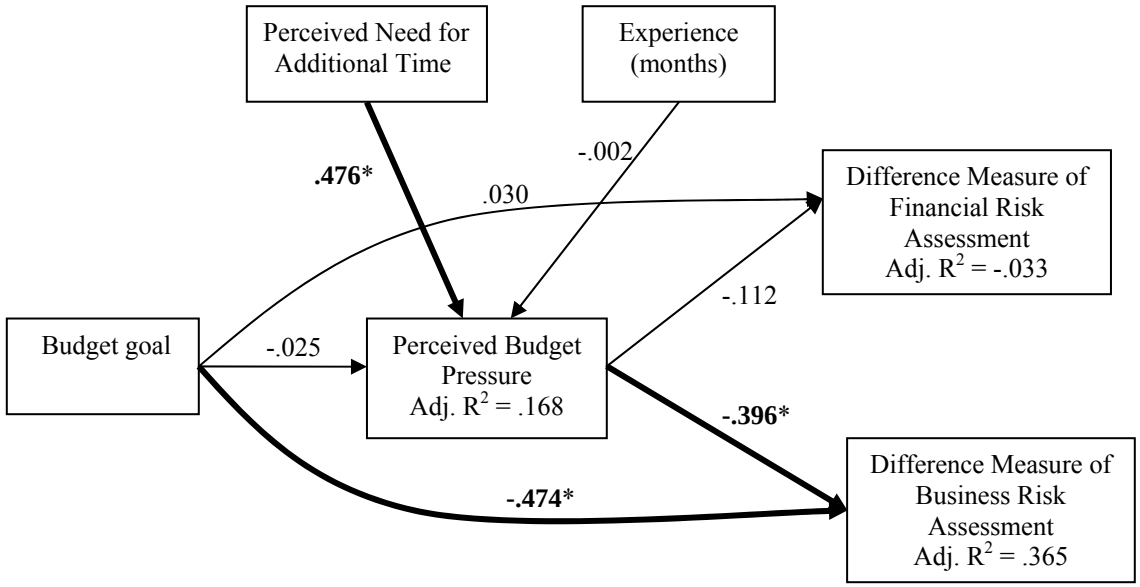
Figure 4 panel B shows the path analysis for auditors that did not use a decision aid. These auditors did not have a tool to aid ability; therefore, I expect that goals cannot motivate these individuals. Additionally, I expect that these auditors cannot respond to perceived budget pressure in an adaptive manner. Without use of a decision aid to proxy for ability, the more stringent budget constraint increased perceived budget pressure, but had no effect on the difference measures. The increase in perceived budget pressure also had no effect on the business risk assessment difference measure.

An interesting difference in the two path models in Figure 4 are the paths from the Budget Constraint variable to the Perceived Budget Pressure variable. When the auditor used a decision aid, more stringent budget constraints *did not increase* perceived budget pressure. Without the use of a decision aid, more stringent budget constraints *did increase* perceived budget pressure. This suggests that the structuring decision aid can alleviate perceived pressures associated with more stringent budget constraints.

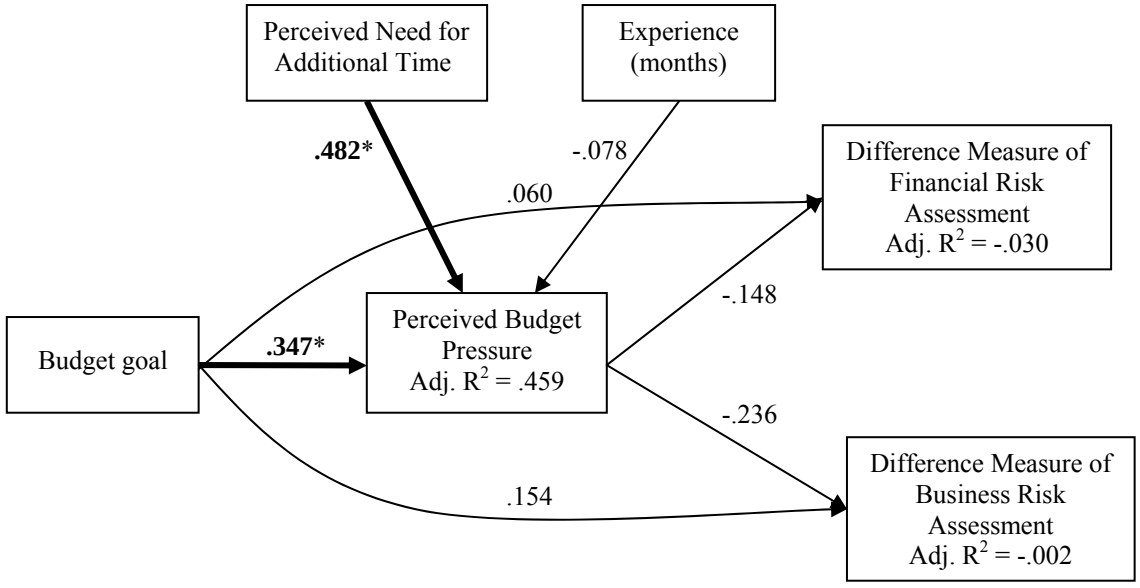
Figure 4.

Path Analysis Models of Routes to Improved Risk Assessments

Panel A: Risk Assessment with Decision Aid



Panel B: Risk Assessment without Decision Aid



* $p < .01$
All coefficients are shown standardized. Results are shown for absolute differences.

Overall, the results of the path analysis support the theory that auditor ability is essential to implementing any methods that improve auditor business risk assessments. Auditors in the treatments without decision aids felt increased pressure, but were unable to use this to improve risk assessments because they did not have the ability. On the other hand, auditors with use of a decision aid to enhance their ability were able to show improved business risk assessments.

Summary

The results of Experiment One support the proposition that auditors are better at identifying financial risks than business risks. Results also indicate that budget constraints do not affect risk identification for either financial or business risks. This is likely due to the importance of risk identification. Auditors are expected to identify relevant risks; therefore they do so regardless of budget constraints.

Results of Experiment Two partially support my hypotheses suggesting that ability allows auditors to be positively affected by budget constraints during risk assessment. More stringent budget constraints did not affect financial risk assessments. This is most likely due to auditor responsibility related to the financial audit. Conversely, business risk assessments became more accurate when auditors were provided with a decision aid and given more stringent budget constraints. When improvements in business risk assessments were realized, I find that budget constraints improve performance via a goal route. While I also find that perceived budget pressure improves business risk assessments, it is unrelated to the manipulated budget constraints.

Perceived budget pressure influences performance independent of the budget constraint goal.

CHAPTER V

DISCUSSION AND CONCLUSIONS

This research investigates risk analysis within a risk based audit environment. Risk based audit approaches have become increasingly popular in recent years. These approaches support the idea that if auditors understand the client business, they are better able to identify potential audit risk areas, and perform more effective, and possibly more efficient, audits. This study employs two experiments to investigate both risk identification and risk assessment within a RBA environment.

There are three key findings from this research study. First, I find that audit seniors are better able to identify financial risks compared to business risks, suggesting there are differences in schematic knowledge related to these two risk types. Results also indicate that budget constraints do not improve risk identification. This result was expected but previously untested. Risk identification has received little attention in the literature, and my study adds to this research stream. Finally, I find that with decision aid use, budget constraints improve performance on a business risk assessment task. This last finding provides insight into ways in which firms can improve business risk assessments and also gives insight into the motivational effects of budget constraints.

Limitations

As with any experimental research, I offer internal validity at a sacrifice to some external validity issues. Audit planning materials are rich; however, they were restricted in this study in order to keep the experiment within an acceptable time frame. Total time allowed for this experiment was not allowed to exceed one hour, therefore the materials

presented were limited. The materials were reviewed by partners at the participating audit firm and were considered to be realistic. Some audit firms provide templates and procedures that are adapted to specific industries to assist auditors in their risk identification and assessment tasks. The use of such materials may improve auditor ability to identify risks, although this question is left to future research and is not answered in the current study.

All of the experimental participants were audit seniors from one Big Four accounting firm. The results of this study, therefore, cannot be generalized to other experience levels. Although other firms use RBA approaches, I cannot determine whether these results are applicable to other firms. Auditing usually involves an audit team made up of individuals with varied experience levels. In this experiment I use individual judgments that do not capture dynamic team interactions. While this is a limitation, it is consistent with prior research in judgment and decision-making in auditing. Addressing risk identification in a team setting may prove a fruitful area for future research. Finally, this study addresses risk identification only during the planning stage of the audit. As the audit progresses, additional risk areas are likely to be identified, changing the audit procedures and, ultimately, the time spent on the audit. Future research could look at how much auditors rely on the initial risk identification and assessment process and how newly identified risks are integrated into the audit plan.

Future Research

There continues to be little research in auditing on the identification of audit risks. Given the importance of this task to the overall audit, additional studies should be

done in this area. Specifically, work dealing with industry specialization effects on risk identification may prove to be an interesting area for study. Also, many audit firms have software to provide assistance in identifying risks and documenting RBA procedures. Future research should look at how auditors use this software to more effectively address audit risks and if reliance on this software has any negative effects on the audit.

Risk based auditing provides additional avenues for research as well. Implementing these audits and including work to address business risks entails different types of procedures to verify assumptions. Traditional audit procedures such as vouching or sending confirmations will not be useful for assessing strategic business risks. Investigating new audit procedures and documentation of evidence may also prove to be an interesting study.

The planning fallacy is the inability of a person to estimate the time to complete a task (Kahneman and Tversky 1979). (E.g. A person estimates that writing a report will take two hours, but it actually takes four.) I am not aware of any audit studies that address how often auditor-created budgets are actually inaccurate due to the planning fallacy. The extant literature investigates auditor reaction to budget limits; however there are no studies that investigate if the budgets are attainable or if the budgets are accurate. Future research should investigate the accuracy of auditor time budgets because this has implications for audit planning, client billing, and auditor job stress.

Discussion and Conclusions

There has been conjecture in the business and academic press that auditors have limited ability to identify risks in a RBA environment (Cullinan and Sutton 2002; Weil

2004). In addition, risk identification processes have had little attention in the auditing literature (Bedard and Graham 2002). This study uses an experiment to investigate auditor risk identification in a RBA environment. I find that auditors are better able to identify audit risks that are financial in nature, than those that represent strategic business risks. This finding is important because it provides evidence supporting claims that auditors may not be very good at identifying risks (Cullinan and Sutton 2002; Weil 2004).

I also test whether budget constraints improve risk identification. As expected, I find that budget constraints have no effect. I expected this result because auditors recognize the importance of risk identification to the audit. They realize that not identifying risks can lead to audit failures. Therefore, the identification of risks is not affected by an external factor such as budget constraints. Risk identification appears to be limited by auditor ability.

In a separate analysis, I address the effects of budget constraints on risk assessment. I find that financial risk assessments are not affected by budget constraints as auditors already have a high level of schematic knowledge related to these risks. Conversely, I find that when a decision aid is used, a stringent budget constraint induces improved business risk assessments. Additionally, I find that business risk assessments are improved via both of the theoretical routes discussed in this paper when a decision aid is provided. Auditors with improved ability have better risk assessments when they have a more difficult goal in the form of a budget constraint. Also, performance improved as these auditors perceived increased budget pressure, indicating that they

made use of an adaptive time pressure strategy. This implies that instituting moderate budget pressure on engagements can improve auditor performance when the auditors have the requisite ability.

This study contributes to the accounting literature in several ways. First, it informs the audit literature regarding budget constraints and decision aid use as a way to improve risk assessments related to business risks. Prior research in auditing has found that risk assessments are improved when made by industry specialist auditors (Low 2004). This study suggests that when industry specialists are not available, assessments can be improved through use of a non-deterministic decision aid.

The current study also has implications for practice. First, I find that the ability of audit seniors to identify business risks is limited. This has serious implications for firms using a RBA approach. Firms that use RBA methods should consider ways to improve business risk identification such as providing additional training, including industry risk experts on engagement teams, and ensuring up-front involvement of experienced personnel during audit planning. Additionally, there is anecdotal evidence that audit managers and partners use budgets as a motivational tool for audit staff. I find that more stringent budget constraints can provide motivation, assuming that personnel have ability to act on these goals.

REFERENCES

Alderman, C. W., and J. W. Deitrick. 1982. Auditors' perceptions of time budget pressures and premature sign-offs: A replication and extension. *Auditing: A Journal of Practice and Theory* 1 (2):54-68.

Ariely, D., and D. Zakay. 2001. A timely account of the role of duration in decision making. *Acta Psychologica* 108:187-207.

Armstrong, J. S., W. B. Denniston, and M. M. Grodon. 1975. The use of the decomposition principle in making judgments. *Organizational Behavior and Human Performance* 14:257-263.

Arvai, J. L., R. Gregory, and T. L. McDaniels. 2001. Testing a structured decision approach: Value-focused thinking for deliberative risk communication. *Risk Analysis* 21 (6):1065-1076.

Asare, S. K., G. M. Trompeter, and A. M. Wright. 2000. The effect of accountability and time budgets on auditors' testing strategies. *Contemporary Accounting Research* 17 (4):539-560.

Ashton, R. H. 1974. An experimental study of internal control judgments. *Journal of Accounting Research* (Spring): 143-57.

_____, R. and Brown. 1980. Descriptive modeling of auditors' internal control judgments: Replication and extension. *Journal of Accounting Research* (Spring): 269-277.

Ballou, B., C. E. Earley, and J. Rich. 2004. The impact of strategic-positioning information on auditor judgments about business-process performance. *Auditing: A Journal of Practice and Theory* 23 (2): 71-88.

Ballou, B., and D. L. Heitger. 2003. Revisiting Koonce's cognitive characterization of audit analytical procedures: Ten years later and the introduction of strategic-systems auditing. Working paper, Miami University.

Bedard, J. C., and L. E. Graham. 2002. The effects of decision aid orientation on risk factor identification and audit test planning. *Auditing: A Journal of Practice and Theory* 21 (2):39-56.

Bell, T. B., F. O. Marrs, I. Solomon, and H. Thomas. 1997. *Auditing Organizations through a strategic-systems lens: The KPMG business measurement process*. Montvale, NJ: KPMG Peat Marwick, LLP.

Bell, T. B., M. E. Peecher, and I. Solomon. 2002. The strategic-systems approach to auditing. In *Cases in Strategic-systems Auditing*, edited by T. B. Bell and I. Solomon. Montvale, NJ: KPMG LLP.

Bierstaker, J. L., and E. O'Donnell. 2003. Strategic assessment during business-risk audits: The power of a holistic perspective. Working paper, University of Massachusetts-Boston.

Bonner, S. E. 1994. A model of the effects of audit task complexity. *Accounting, Organizations and Society* 19 (3):213-234.

Braun, R. L. 2000. The effect of time pressure on auditor attention to qualitative aspects of misstatements indicative of potential fraudulent financial reporting. *Accounting, Organizations and Society* 25:243-259.

Choy, A. K., and R. R. King. 2002. An experimental investigation of audit decision-making: An evaluation using system-mediated mental model theory. Working paper, Washington University.

Cullinan, C. P., and S. G. Sutton. 2002. Defrauding the public interest: A critical examination of reengineered audit processes and the likelihood of detecting fraud. *Critical Perspectives in Accounting* 13:297-310.

DeZoort, F. T., and A. T. Lord. 1997. A review and synthesis of pressure effects research in accounting. *Journal of Accounting Literature* 16:28-85.

Drach-Zahavy, A., and M. Erez. 2002. Challenge versus threat effects on the goal-performance relationship. *Organizational Behavior and Human Decision Processes* 88:667-682.

Durham, C. C., E. A. Locke, J. M. L. Poon, and P. L. McLeod. 2000. Effects of group goals and time pressure on group efficacy, information-seeking strategy, and performance. *Human Performance* 13 (2):115-138.

Eilifson, A., W. R. Knechel, and P. Wallage. 2001. Application of the business risk audit model: A field study. *Accounting Horizons* 15 (3):193-207.

Eining, M.M., D.R. Jones, and J.K. Loebbecke. 1997. An experimental examination of the impact of decision aids on the assessment and evaluation of management fraud. *Auditing: A Journal of Practice and Theory* 16 (2): 1-19.

Glover, S. M. 1997. The influence of time pressure and accountability on auditors' processing of nondiagnostic information. *Journal of Accounting Research* 35 (2):213-226.

Glover, S.M., D.F. Prawitt, and B.C. Spilker. 1997. The influence of decision aids on user behavior: Implications for knowledge acquisition and inappropriate reliance. *Organizational Behavior and Human Decision Processes* 72 (2): 232-255.

Gramling, A. A., K. Johnstone, and B. Mayhew. 2001. Behavioral research in auditing: past, present, and future research. *Advances in Accounting Behavioral Research* 4: 47-75.

Houston, R. W. 1999. The effects of fee pressure and client risk on audit seniors' time budget decisions. *Auditing: A Journal of Practice and Theory* 18:70-86.

Kahneman, D., and A. Tversky. 1979. Intuitive prediction: Biases and corrective procedures. *TIMS Studies in the Management Sciences* 12:313-327.

Kelley, T., and L. Margheim. 1990. The impact of time budget pressure, personality, and leadership variables on dysfunctional auditor behavior. *Auditing: A Journal of Practice and Theory* 9:21-42.

Kelley, T., and R. E. Seiler. 1982. Auditor stress and time budgets. *The CPA Journal*:24-34.

Kermis, G. F., and S. Mahapatra. 1985. An empirical study of the effects of time pressure on audit time allocations. *Advances in Accounting* 2:261-273.

Klem, L. 2001. Path Analysis. In *Reading and Understanding Multivariate Statistics*, edited by L. G. Grimm and P. R. Yarnold. Washington, DC: American Psychological Association.

Kotchetova, N. 2004. The impact of client strategy content and strategy process on risk assessment and audit planning. Working paper, University of Waterloo.

Latham, G. P. 2000. The reciprocal effects of science on practice: Insights from the practice and science of goal setting. *Canadian Psychology* 42 (1):1-11.

Lemon, W. M., K. W. Tatum, and W. S. Turley. 2000. *Developments in the audit methodologies of large accounting firms*. London, UK: ABG Professional Information.

Lightner, S. M., S. J. Adams, and K. M. Lightner. 1982. The influence of situational, ethical, and expectancy theory variables on accountants' underreporting behavior. *Auditing: A Journal of Practice and Theory* 2:1-12.

Locke, E. A. 2000. Motivation, cognition, and action: An analysis of studies of task goals and knowledge. *Applied Psychology: An International Review* 49 (3):408-429.

Locke, E. A., and G. P. Latham. 2002. Building a practically useful theory of goal setting and task motivation. *American Psychologist* 57 (9):705-717.

Low, K.-Y. 2004. The effects of industry specialization on audit risk assessments and audit-planning decisions. *The Accounting Review* 79 (1):201-219.

MacGregor, D., S. Lichtenstein, and P. Slovic. 1988. Structuring knowledge retrieval: An analysis of decomposed quantitative judgments. *Organizational Behavior and Human Decision Processes* 42:303-323.

Marxen, D. E. 1990. A behavioral investigation of time budget preparation in a competitive audit environment. *Accounting Horizons* 4 (2):47-57.

McDaniel, L. S. 1990. The effects of time pressure and audit program structure on audit performance. *Journal of Accounting Research* 28 (2):267-285.

Mousavi, S. Y., R. Low, and J. Sweller. 1995. Reducing cognitive load by mixing auditory and visual presentation modes. *Journal of Educational Psychology* 87 (2):319-334.

Nisbett, R. E., H. Zuckier, and R. E. Lemley. 1981. The dilution effect: Nondiagnostic information weakens the implications of diagnostic information. *Cognitive Psychology* 13:248-277.

O'Donnell, E., and J. J. Schultz. 2003. The influence of strategic assessment on auditor judgment about inconsistent fluctuations in accounts. Working paper, Arizona State University.

Ott, R. L., and M. Longnecker. 2001. *An Introduction to statistical methods and data analysis*. Pacific Grove, CA: Duxbury.

Payne, J. W., J. R. Bettman, and E. J. Johnson. 1988. Adaptive strategy selection in decision making. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 14:534-552.

Payne, J. W., J. R. Bettman, and E. J. Johnson. 1993. *The adaptive decision maker*. New York: Cambridge University Press.

Peters, L. H., E. J. O'Conner, A. Pooyan, and J. C. Quick. 1984. The relationship between time pressure and performance: A field test of Parkinson's Law. *Journal of Occupational Behavior* 5:293-299.

Ponemon, L. A. 1992. Auditor underreporting of time and moral reasoning: An experimental lab study. *Contemporary Accounting Research* 9 (1):171-189.

Rose, J. and C.J. Wolfe. 2000. The effects of system design alternatives on the acquisition of tax knowledge from a computerized tax decision aid. *Accounting, Organizations and Society* 25 (3): 285-306.

Russo, J. E., V. H. Medvec, and M. G. Meloy. 1996. The distortion of information during decisions. *Organizational Behavior and Human Decision Processes* 66 (1):102-110.

Russo, J. E., M. G. Meloy, and V. H. Medvec. 1998. Predecisional distortion of product information. *Journal of Marketing Research* 35 (4):438-452.

Russo, J. E., M. G. Meloy, and T. J. Wilks. 2000. Predecisional distortion of information by auditors and salespersons. *Management Science* 46 (1):13-27.

Slovic, P., B. Fischhoff, and S. Lichtenstein. 1977. Behavioral Decision Theory. *Annual Review of Psychology* 28:1-39.

Taylor, M. 2002. The effects of industry specialization on auditors' inherent risk assessments and confidence judgments. *Contemporary Accounting Research* 17 (4):693-712.

Weil, J. 2004. Behind wave of corporate fraud: A change in how auditors work. *The Wall Street Journal*, March 25, 2004, A1.

Whitecotton, S.M. and S.A. Butler. 1998. Influencing decision aid reliance through involvement in information choice. *Behavioral Research in Accounting* 10 (Supplement):182-200.

Wilks, T. J. 2002. Predecisional distortion of evidence as a consequence of real-time audit review. *The Accounting Review* 77 (1):51-71.

APPENDIX A

SCRIPT

Script

You have been requested to assist with an experiment about risk identification and assessment. In a few minutes you will each receive an envelope. Inside the envelope are several stapled packets of paper. Please read the page marked "Read this Page first."

Next, you will complete the demographic questions and read an introduction to the case.

When that is done, you will use the packet marked company information to help you to complete the items in the Risk Template. Please complete the Risk Template and using the Company Information provided.

After you have completed the risk template, please fill out the short debriefing questionnaire. You will have about one hour to complete these materials.

Please note that your package may be different than your fellow participants'. It is important that you not discuss or compare information as your tasks may be different.

Thank you for your participation in this research.

At this time I will distribute the envelopes.

(At 11:55) At this time you have only a few minutes remaining. Please complete what you are working on and put the materials back in the envelope.

(At 11:58) At this time, please pass your envelopes to the front of the room with all materials in them and I will collect them.

Again, I thank you for your participation.

APPENDIX B

EXPERIMENT ONE INSTRUCTIONS

General Instructions

1. This study will provide insights about how auditors identify audit risks.
2. This envelope contains several parts.
    - Information Sheet
    - Administrative Materials & Demographics (this booklet)
    - Company Information
    - Risk Template
    - Debriefing Questionnaire.
3. Complete this booklet after you have read these instructions.
4. Review the Company Information and Risk Template next so that you can determine the most efficient way to complete the research task within the allotted time.
5. Complete the Debriefing Questionnaire last.
6. Additional instructions will appear as necessary throughout the booklets.
7. Please do not communicate with the other participants while you are completing this study. Different participants have different tasks.
8. You will have one hour to complete this study. Please monitor the time to try to complete the whole study within the hour.

I thank you for agreeing to participate in this study!

Michelle Chandler Diaz
Doctoral Student
Mays Business School
Texas A&M University

APPENDIX C

DEMOGRAPHIC QUESTIONNAIRE

Demographic Information

1. How many months of audit experience do you have?

   _____ months

2. What is your current job title?

   _____

3. How many months have you held this title?

   _____ months

4. In what industries (or business groups) have you currently or previously been designated by your firm as an audit specialist?

Time	Industry	Number of Months
Current		
Previous		
Previous		

5. Since you began at the firm, what percentage of time have you spent performing audits of manufacturing companies?

   _____% of my time has been spent auditing manufacturing companies.

6. Have you ever audited a company that manufactured equipment used to analyze air and water samples?

   Yes No

7. If you answered yes to question six, how much time in months have you spent working on this client?

   ____ months

8. Do you have any experience other than audit experience that includes work with a company that manufactured equipment used to analyze air and water samples?

   Yes No

9. Please indicate the percent of your clients that fall in the following categories for annual audit hours. Please estimate to the best of your ability if you are unsure.

Annual Audit Hours	Percent
500 or less	
501-800	
801-1100	
1101-1400	
More than 1400	
Total	100%

10. Choose the answer that is representative of most of the clients on which you work. The **initial budget** that is set for my audits by the partner or manager is
    a. Very inadequate to complete the work.
    b. Not quite adequate to complete the work.
    c. Adequate to complete the work if everything goes well.
    d. Adequate to complete the work comfortably.
    e. More than adequate. I rarely have trouble meeting the initial budget.

APPENDIX D

EXPERIMENT ONE RESEARCH TASK

(450 AND 600 HOUR TREATMENTS)

Research Task

You have recently been informed that your office has accepted a new client, Chemical Analysis Products Inc. (CAP) and you will be the in-charge on this engagement. This company manufactures analyzer machines that test for impurities and other chemicals in air and water samples.

The manager on the engagement has asked you to review some information about the industry and the client and provide her with an initial list of audit risk areas. You can find information about the client, including the prior year financial statements in Company Information.

For each audit risk area, she has also requested that you provide a rough estimate of the total hours you expect to spend to audit that area. She has told you that it is important to watch the budget on this relatively small client and that she wants you to work from **an initial budget of 450 hours**. In her discussions with the previous auditors, she learned that they **typically spent about 500 hours on the audit**. She has provided you with a template for listing these risks with the related hours (See Risk Template).

Research Task

You have recently been informed that your office has accepted a new client, Chemical Analysis Products Inc. (CAP) and you will be the in-charge on this engagement. This company manufactures analyzer machines that test for impurities and other chemicals in air and water samples.

The manager on the engagement has asked you to review some information about the industry and the client and provide her with an initial list of audit risk areas. You can find information about the client, including the prior year financial statements in Company Information.

For each audit risk area, she has also requested that you provide a rough estimate of the total hours you expect to spend to audit that area. She has told you that it is important to watch the budget on this relatively small client and that she wants you to work from **an initial budget of 600 hours**. In her discussions with the previous auditors, she learned that they **typically spent about 500 hours on the audit**. She has provided you with a template for listing these risks with the related hours (See Risk Template).

APPENDIX E

COMPANY INFORMATION

Company Information

General

Chemical Analysis Products, Inc. (the "Company" or CAP) is a corporation that was organized in 1974, in the State of Texas. CAP is located in College Station, Texas.

CAP designs, manufactures, markets, and services products primarily for specialized applications in the analytical instruments markets. CAP's principal business strategy is to direct its product development capabilities, manufacturing processes, and marketing skills toward market niches that it believes it can successfully penetrate and quickly assume a leading position. Management continually emphasizes product innovation, improvement in quality and product performance, on-time delivery, cost reductions, and other value-added activities. CAP seeks growth opportunities through technological and product improvement, the development of new applications for existing products, and by the acquisition and development of new products, new markets, and new competencies.

Products

CAP develops, manufactures, markets, and services analytical, monitoring, and sample preparation products, components, and systems used to detect, measure, and analyze chemical compounds. Such products include:

Gas Chromatography Instruments and Systems CAP designs, manufactures, markets, and services components for gas chromatographs. Gas chromatographs can analyze chemical compounds in gas, liquids, or solids matrices using the appropriate components.

Total Organic Carbon Analyzer Systems CAP designs, manufactures, markets, and services Total Organic Carbon analyzers and related accessories that are used to measure organic and inorganic carbon levels in water, soils, and solids used in U.S. pharmaceutical methods, the manufacturing of semiconductors, power generation, and oceanographic research.

Ion Analysis Systems CAP designs, manufactures, markets, and services ion analysis flow systems. These instruments perform a wide range of ion analyses, including the measurement of nitrate, nitrite, phosphate, ammonia, chloride, alkalinity, and sulfate in liquids.

Sample Preparation Products and Systems CAP designs, manufactures, markets, and services sample preparation instrumentation used to prepare sample matrices for analysis. The most time-consuming part of chemical analysis is sample preparation. Procedures, techniques, and instruments that can reduce total sample preparation time are highly desirable for the analysis of chemical compounds.

Beverage Analyzers During 2004, the first sale of the BEV 2100 was made. This is an online beverage monitor that measures sugar, diet and carbon dioxide levels in beverage process streams. Major domestic soft drink producers have established preferred vendor programs, and CAP's ability to become a qualified supplier to the major domestic soft drink producers will affect their ability to penetrate this market.

Manufacturing

CAP manufactures products by using similar techniques and methods at two locations in the U.S. CAP's products have been certified pursuant to safety standards by Underwriters Laboratories (UL) that certify that instruments meet certain performance standards and that advertised specifications are accurate. In 1999, CAP obtained ISO 9001 certification at both of its manufacturing operations.

Technical Support

CAP employs a technical support staff that provides on-site installation, service, and after-sale support of its products in an attempt to ensure customer satisfaction. Technical support services are included in the initial sale of certain products and, if not included in the initial purchase, may be purchased later by customers. CAP offers training courses and publishes technical bulletins containing product repair information, parts lists, and application support information for customers. CAP installs and services its products through its field service personnel and through third-party contractors.

Research and Development

The analytical instrumentation industry is subject to rapid changes in technology. The Company's success is heavily dependent on its ability to continually improve its existing products, advance technologies, increase product reliability and performance, and improve data handling. CAP actively pursues development of potential new products, thereby incurring significant R&D costs each year. During the third quarter of 2003, CAP announced its commitment to increase spending on R&D of potential new products, and spending on R&D was up 20% from the prior year. Although spending will fluctuate from period to period, overall spending on R&D is expected to increase in 2004.

Some markets that CAP services are experiencing slow growth and declining revenues. CAP cannot maintain the market position of every product without incurring development expense that is higher than the industry average of 7-9% of sales. In those segments, current investment levels are being evaluated and may be discontinued by December 2004.

CAP encounters aggressive competition in all aspects of its business activity. CAP competes with many firms in the design, manufacture, and sale of analytical instruments, principally on the basis of product technology and performance, product quality and reliability, sales and marketing capability, access to channels of distribution and product

support, and delivery and price. Most of CAP's competitors have significantly greater resources than CAP in virtually all aspects of competition, including financial and related resources, market coverage on a global basis, breadth of product(s) in each market segment(s) served, access to human and technical resources, buying power, and marketing strength, including brand recognition and market share.

Patents

CAP holds both U.S. and international patents. CAP currently holds 25 patents as of year-end 2003, which expire between the years 2004 and 2020, compared to the 19 patents it held in the prior year. CAP seeks patent coverage on technology developments that it regards as material and patentable. While CAP believes that all of its patents and applications have value, its future success is not dependent on any single patent or application.

Market Trends

The environmental testing market has been and continues to be an important market for CAP's current product market position. Customers in this market include municipal, state, and federal governments; industrial and engineering firms; commercial testing laboratories and academic institutions. Market demand for environmental testing is determined primarily by federal legislation, and funding for enforcement of this legislation. Increased concerns about protecting the nation's water supply will require more emphasis on testing to ensure water quality in the public waterways, lakes, and drinking water.

CAP's customers include various military agencies of the U.S. government, industrial businesses, semiconductor manufacturers, engineering and consulting firms, municipalities, environmental testing laboratories, and beverage bottlers. No single customer accounted for more than 10% of revenues in 2003. One customer accounted for approximately 10% of revenues in 2002. Federal, state, and municipal governments and public and private research institutions in the aggregate accounted for 20% of revenues in 2003 and 17% of revenues in 2002. Export sales accounted for 27% of revenues in 2003, compared to 25% of revenues in 2002.

In recent years, the U.S. environmental laboratory testing industry has declined, leading to significant consolidation in this market. Internationally, however, some countries are just beginning to develop environmental policies. CAP intends to invest effort in developing strong relationships with representatives in key developing markets.

CAP markets and sells analytical components and systems that it manufactures and that it purchases for resale, provides on-site installation and support services, and distributes expendables and accessories required to support the operation of products sold. CAP

sells its products domestically to end users through a direct sales channel, manufacturers' representatives, distributors, and resellers, and internationally through independent manufacturers' representatives and distributors.

Company Officers

John R. Smith joined CAP as President and Chief Operating Officer on July 7, 1985, named Chief Executive Officer of CAP on July 19, 1986, and appointed Chairman of the Board of Directors of CAP on May 26, 1990. Prior to joining CAP, he was Executive

Vice President and General Manager of the Howell Division of SMA Inc.; Division Managing Engineer of Chem-all, Inc.; Assistant Plant and Engineering Manager, Bell Industries.

Rita B. Hayes has been employed with CAP since 1981. She was named Corporate Secretary and Executive Vice President in 1989.

Jack M. Fox joined CAP as Corporate Controller on June 30, 2001. Prior to joining CAP, he was an Audit Manager for Ernst & Young LLP in New Orleans, Louisiana. He received his Certified Public Accountant certification in 1998. On June 17, 2002, he was named Executive Vice President and Chief Financial Officer.

Environmental Regulations

CAP believes it is in compliance with federal, state, and local laws and regulations involving the protection of the environment. CAP routinely handles small amounts of materials that might be deemed hazardous. Hazardous materials are primarily introduced into CAP's products by end-users rather than by CAP. CAP believes there will be no material effect upon its capital expenditures, earnings, and competitive position caused by its compliance with federal, state, or local provisions regulating the discharge of materials into the environment or relating to the protection of the environment. However, to the extent that analytical instruments designed and manufactured by CAP for environmental analysis are purchased by its customers to assist them in complying with environmental regulations, changes to these regulations could reduce demand for some of CAP's products.

Suppliers

CAP produces its products from raw materials, component parts, and other supplies that are generally available from a number of different sources. CAP has few long-term contracts with suppliers. For certain purchased materials, CAP has developed preferred sources on the basis of quality and service. Several purchased components are supplied by single-source suppliers.

Recent Developments

To better position CAP with the technology needed to provide leading-edge products for use in homeland defense, security, and other markets, CAP entered a strategic alliance with Lexus Products Co. ("Lexus"). The alliance includes a commercial agreement and investment of $1,000,000 in a Series A Preferred Share offering by Lexus. Upon conversion, CAP's investment will represent, on a fully diluted basis, approximately 15% ownership in Lexus common shares. Under the Commercial Agreement, CAP will provide up to $1,350,000 for the completion by Lexus of certain product developments according to agreed- upon milestones and is entitled to certain intellectual property controlled by Lexus.

During the quarter ended September 30, 2002, CAP completed an evaluation of the future prospects of certain products and determined to discontinue manufacturing, sales, service, and support for certain sample preparation, gas chromatography, and ion analyzer products. CAP came to these decisions because purchase components are no longer available for support of those products and sales volumes for those products no longer represent a viable business opportunity for CAP.

CAP began to repurchase shares of CAP's common stock under the stock repurchase program during 2003, reducing the shares outstanding to 2,748,625 as of December 31, 2003. CAP expects to continue to repurchase stock throughout 2004.

Accounting Policies Information

Revenue Recognition CAP derives revenues from three sources: system sales, part sales, and services. For system sales and parts sales, revenue is generally recognized when persuasive evidence of an arrangement exists, delivery has occurred, the contract price is fixed or determinable, title and risk of loss has passed to the customer, and collection is reasonably assured. CAP's sales are typically not subject to rights of return. Historically, sales returns have not been significant. For certain system sales that involve unique customer acceptance terms or new specifications or technology with customer acceptance provisions, all revenue is generally deferred until customer acceptance. Revenue related to part sales is recognized when the parts have been shipped and title and risk of loss have passed to the customer. Deferred revenue is included in accrued liabilities in the balance sheet.

Accounts Receivable CAP maintains allowances for doubtful accounts for estimated losses resulting from the failure of its customers to make required payments and for estimated sales returns. Customers may not make payments or may return products due to a variety of reasons including deterioration of their financial condition or dissatisfaction with CAP's products. Management makes regular assessments of doubtful accounts and uses the best information available including correspondence with customers and credit reports.

Inventories Inventories consist of electronic equipment and various components. CAP operates in an industry where technological advances or new product introductions are a frequent occurrence. CAP had changes in required reserves in recent periods due to discontinuation of certain product lines and obsolescence related to new product introductions, as well as declining market conditions.

Intangible Assets CAP's intangible assets primarily include product patents, trade names and trademarks. CAP adopted Statement of Financial Accounting Standards (SFAS) No. 142, on January 1, 2002, as required. Accordingly, CAP annually reviews the recoverability and estimated useful lives of other intangible assets for impairment. During the quarter ended June 30, 2004, CAP completed an evaluation of the future prospects of certain products and determined to discontinue manufacturing, sales, service, and support for certain sample preparation, gas chromatography, and ion analyzer products. CAP came to these decisions because purchase components are no longer available for support of those products and sales volume for those products no longer represent a viable business opportunity for CAP.

Product Warranties Products generally carry one year of warranty. Once the warranty period has expired, the customer may purchase an extended product warranty typically covering an additional period of one year. Extended warranty billings are generally invoiced to the customer at the beginning of the contract term.

APPENDIX F

RECENT INDUSTRY ARTICLE*

* Reprinted with permission from "Industry Watch" and Region Watch" 2004. *Instrument Business Outlook*, 13(1): 5. 2004 by Strategic Directions International, Inc.

Industry Watch

Food & Beverage: A new report from the National Academies' Institute of Medicine addresses the regulation of dietary supplements by the FDA. Presently, supplements are regulated as foods, not drugs, and thus do not need FDA approval to be sold. However, the FDA can remove products from the market if it proves they are unsafe. Most recently, the FDA banned sales of ephedra. The report recommends that the FDA require dietary supplement makers to notify it of adverse effects to their products and that they supply it with safety data about new products based on animal studies, lab tests and trials if human data are insufficient. There are approximately 29,000 supplements on the market with total estimated annual sales of $16 billion. Of the supplements examined, the report notes the adverse effects of chaparral, glucosamine and saw palmetto. Congressional legislation is also pending that would require greater oversight of supplements by the FDA. But any action faces opposition from the supplement industry and practical considerations about the FDA's resources.
Source: *Nature*

Environmental: An EPA study, "Nationwide Disinfection By-product Occurrence," found significant levels of 50 of the most toxic disinfection by-products (DBPs) in drinking water nationwide. The study focused on the presence of DBPs for which no quantitative information exists. It also sought to identify new DBPs using mass spectrometry. The results may be used to establish future regulations for monitoring and testing methods.
Source: *Environmental Laboratory Washington Report*

Region Watch

Japan: In order to speed approval times for its $50 billion drug market, Japan, on April 1, formed the Pharmaceutical and Medical Devices Agency (PMDA), a new organization for approving drug and medical devices, although final approval authority remains with the Ministry of Health, Labor and Welfare. The PMDA replaces the Organization for Pharmaceutical Safety and Research, the Medical Device Evaluation Center and the Japan Association for the Advancement of Medical Equipment. The PMDA will provide consultations, review products and monitor side effects. Japan takes over 20 months to approve drugs, a rate much slower than either the US or Europe. Also, many of the drugs it approves are already in use elsewhere. Over the next five years, the PMDA's target is to approve 80% of new drug applications per year, up from the current 50% rate. The agency's staffing levels are estimated to increase from 317 to 357 over the next five years and user fees may double to ¥16 million ($150,000) per drug, compared to the FDA's fee of $550,000 per drug.
Source: *Reuters*

China: Chinese officials are concerned about water, electricity and coal shortages and the sustainability of economic growth. GDP for the first quarter is expected to exceed last year's 9.1% pace, driven in part by the steel and cement industries. Steel output climbed almost 30% and cement output rose 24%. The country faces water shortages of between 30 billion and 40 billion cubic meters and China's energy deficit may reach 20 million kilowatts this year, twice 2003's figure. Although the shortage could eliminate inefficient operations, the metals business continues to grow capacity.
Source: *Financial Times*

APPENDIX G

EXPERIMENT ONE RISK TEMPLATE AND INSTRUCTIONS FOR 450 AND 600 HOUR TREATMENTS

Instructions

1. Make a list of audit risks in the template that follows. Name each risk and provide a brief description if the name is not explanatory.
2. For each risk, use your judgment to determine if this audit risk is High, Medium, or Low and circle your evaluation in the appropriate column.
3. Assign an estimate of hours you expect to spend auditing each risk area that you list.
4. Sum the hours for the risks listed on each page and write in the space provided.
5. Make sure that the total of your hours is equal to 600 hours by completing the Reconciliation of Hours in the Risk Template.

Instructions

1. Make a list of audit risks in the template that follows. Name each risk and provide a brief description if the name is not explanatory.
2. For each risk, use your judgment to determine if this audit risk is High, Medium, or Low and circle your evaluation in the appropriate column.
3. Assign an estimate of hours you expect to spend auditing each risk area that you list.
4. Sum the hours for the risks listed on each page and write in the space provided.
5. Make sure that the total of your hours is equal to 450 hours by completing the Reconciliation of Hours in the Risk Template

Risk 1	**Hours**

Level of Risk 1						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 2	**Hours**

Level of Risk 2						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 3	**Hours**

Level of Risk 3						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 4	Hours

Level of Risk 4						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 5	Hours

Level of Risk 5						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 6	Hours

Level of Risk 6						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 7	Hours

Level of Risk 7						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 8	Hours

Level of Risk 8						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 9	Hours

Level of Risk 9						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 10	Hours

Level of Risk 10						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 11	Hours

Level of Risk 11						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 12	Hours

Level of Risk 12						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 13	Hours

Level of Risk 13						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 14	Hours

Level of Risk 14						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 15	Hours

Level of Risk 15						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 16	Hours

Level of Risk 16						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 17	Hours

Level of Risk 17						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 18	Hours

Level of Risk 18						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 19	**Hours**

Level of Risk 19						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

Risk 20	**Hours**

Level of Risk 20						
1	2	3	4	5	6	7
Very Low Risk			Moderate Risk			Very High Risk

APPENDIX H

RECONCILIATION OF HOURS IN THE RISK TEMPLATE

(450 AND 600 HOUR TREATMENTS)

Reconciliation of Hours in the Risk Template

Instructions: While reading the company information, use the following pages to list audit risks that you identify. Estimate hours and assess the level of each of these risks. Next, add the total hours from each risk in this table to ensure that the total allocated hours are equal to the total budgeted hours assigned by the manager in part one of the case. You do not need to list 20 risks. Just complete as many as you deem appropriate to the client.

Risk Template Page	Estimated Hours on Page
Risk 1	
Risk 2	
Risk 3	
Risk 4	
Risk 5	
Risk 6	
Risk 7	
Risk 8	
Risk 9	
Risk 10	
Risk 11	
Risk 12	
Risk 13	
Risk 14	
Risk 15	
Risk 16	
Risk 17	
Risk 18	
Risk 19	
Risk 20	
Total of All Risks	450

Reconciliation of Hours in the Risk Template

Instructions: While reading the company information, use the following pages to list audit risks that you identify. Estimate hours and assess the level of each of these risks. Next, add the total hours from each risk in this table to ensure that the total allocated hours are equal to the total budgeted hours assigned by the manager in part one of the case. You do not need to list 20 risks. Just complete as many as you deem appropriate to the client.

Risk Template Page	Estimated Hours on Page
Risk 1	
Risk 2	
Risk 3	
Risk 4	
Risk 5	
Risk 6	
Risk 7	
Risk 8	
Risk 9	
Risk 10	
Risk 11	
Risk 12	
Risk 13	
Risk 14	
Risk 15	
Risk 16	
Risk 17	
Risk 18	
Risk 19	
Risk 20	
Total of All Risks	600

APPENDIX I

DEBRIEFING QUESTIONNAIRE

Debriefing Questionnaire
Do this Last!

1. How many hours did the manager give you as an **initial budget**?

   400 450 500 550 600

2. How many hours did the **previous auditors** take to complete this audit in the past?

   400 450 500 550 600

3. How much budget pressure did **you** feel for this task?
4.

1	2	3	4	5	6	7
Very Low pressure			Moderate pressure			Very High Pressure

5. Was there any additional information you would have liked to have for CAP?
6.

   YES NO

7. If you answered "yes" to number 4 would you have wanted any of the following information? Circle all that apply.

   Analyst Reports MD&A Risk Factors from Form 10K

   Complete Footnotes Other_____

6. Do you feel the hours assigned for this client are adequate based on the risks identified?
7.

   YES NO

8. If you answered "NO" to question 4, how many additional hours would you need?

   1-50 51-100 101-150 151-200 201 or more

Please indicate what information was most important in helping you to complete the task that you just performed. Rate each item from 1-5, where 1 is the most important, 2 is second most important, and 5 is the least important.

Information	Rating
General Text describing CAP, Inc.	
Recent Developments about CAP, Inc.	
Accounting Policies for CAP, Inc.	
Financials for CAP, Inc.	
Excerpts from trade journal	

For each of the following, please rate how useful it was in completing your task in the preceding experiment.

The general text describing CAP, Inc was

Not Useful at all	Somewhat Useful	Useful	Very Useful	Extremely Useful

The recent developments description of CAP, Inc was

Not Useful at all	Somewhat Useful	Useful	Very Useful	Extremely Useful

The text describing the accounting policies of CAP, Inc was

Not Useful at all	Somewhat Useful	Useful	Very Useful	Extremely Useful

The financial statements for CAP, Inc were

Not Useful at all	Somewhat Useful	Useful	Very Useful	Extremely Useful

The excerpts from trade journal related to CAP, Inc was

Not Useful at all	Somewhat Useful	Useful	Very Useful	Extremely Useful

APPENDIX J

INSTRUCTIONS FOR EXPERIMENT TWO

DECISION AID TREATMENTS

General Instructions

1. This study will provide insights about how auditors identify audit risks.
2. This envelope contains several parts.
    - Information Sheet
    - Administrative Materials & Demographics (this booklet)
    - Company Information
    - Risk Assessment Tool
    - Risk Template
    - Debriefing Questionnaire.
3. Complete this booklet after you have read these instructions.
4. Review the Company Information, Risk Assessment Tool and Risk Template next so that you can determine the most efficient way to complete the research task within the allotted time.
5. Complete the Debriefing Questionnaire last.
6. Additional instructions will appear as necessary throughout the booklets.
7. Please do not communicate with the other participants while you are completing this study. Different participants have different tasks.
8. You will have one hour to complete this study. Please monitor the time to try to complete the whole study within the hour.

I thank you for agreeing to participate in this study!

Michelle Chandler Diaz
Doctoral Student
Mays Business School
Texas A&M University

APPENDIX K

INSTRUCTIONS FOR EXPERIMENT TWO

NO DECISION AID TREATMENTS

General Instructions

1. This study will provide insights about how auditors identify audit risks.
2. This envelope contains several parts.
    - Information Sheet
    - Administrative Materials & Demographics (this booklet)
    - Company Information
    - Risk Template
    - Debriefing Questionnaire.
3. Complete this booklet after you have read these instructions.
4. Review the Company Information, Risk Assessment Tool and Risk Template next so that you can determine the most efficient way to complete the research task within the allotted time.
5. Complete the Debriefing Questionnaire last.
6. Additional instructions will appear as necessary throughout the booklets.
7. Please do not communicate with the other participants while you are completing this study. Different participants have different tasks.
8. You will have one hour to complete this study. Please monitor the time to try to complete the whole study within the hour.

I thank you for agreeing to participate in this study!

Michelle Chandler Diaz
Doctoral Student
Mays Business School
Texas A&M University

APPENDIX L

EXPERIMENT TWO RESEARCH TASK

(450 AND 600 HOUR TREATMENTS)

Research Task

You have recently been informed that your office has accepted a new client, Chemical Analysis Products Inc. (CAP) and you will be the in-charge on this engagement. This company manufactures analyzer machines that test for impurities and other chemicals in air and water samples.

The manager on the engagement has asked you to review some information about the industry and the client and look over her list initial list of audit risk areas. You can find information about the client, including the prior year financial statements in Company Information. For each audit risk area, she has requested that you provide a rough estimate of the total hours you expect to spend to audit that area and an overall judgment about the level of that risk.

She has told you that it is important to watch the budget on this relatively small client and that she wants you to work from an **initial budget of 450 hours**. In her discussions with the previous auditors, she learned that they **typically spent about 500 hours on the audit**. She has provided you with a template for listing these risks with the related hours (See Risk Template).

Research Task

You have recently been informed that your office has accepted a new client, Chemical Analysis Products Inc. (CAP) and you will be the in-charge on this engagement. This company manufactures analyzer machines that test for impurities and other chemicals in air and water samples.

The manager on the engagement has asked you to review some information about the industry and the client and look over her list initial list of audit risk areas. You can find information about the client, including the prior year financial statements in Company Information. For each audit risk area, she has requested that you provide a rough estimate of the total hours you expect to spend to audit that area and an overall judgment about the level of that risk.

She has told you that it is important to watch the budget on this relatively small client and that she wants you to work from an **initial budget of 600 hours**. In her discussions with the previous auditors, she learned that they **typically spent about 500 hours on the audit**. She has provided you with a template for listing these risks with the related hours (See Risk Template).

APPENDIX M

RISK LISTING TEMPLATE FOR

450 AND 600 HOUR TREATMENTS

(NOTE THAT THIS ONLY REPRESENTS ONE OF THE RANDOMIZED ORDERS OF THE RISKS)

Risk Template

	Risk Name	Hours	Level of Risk (Circle your choice) Very Low			Moder-ate			Very High
1	Inaccurate valuation of investments.		1	2	3	4	5	6	7
2	Insufficient R&D spending resulting in declining product performance and acceptability.		1	2	3	4	5	6	7
3	Inability to purchase necessary components of inventory from suppliers.		1	2	3	4	5	6	7
4	Compensation insufficient to retain competent personnel.		1	2	3	4	5	6	7
5	The Company's environmental policies and procedures do not adequately prevent environmental issues.		1	2	3	4	5	6	7
6	Inadequate warranty reserves established for products sold under warranty.		1	2	3	4	5	6	7
7	Inadequate inventory reserves due to obsolescence and declining market conditions..		1	2	3	4	5	6	7
8	Collectibility of receivables due to insufficient credit extension policies to new and existing customers.		1	2	3	4	5	6	7
9	Technical support services are inadequate to ensure customer satisfaction.		1	2	3	4	5	6	7
10	Inadequate policies and procedures over deferred revenue resulting in misstated sales.		1	2	3	4	5	6	7
11	Significant profits will not be earned to recover investment in property, plant and equipment.		1	2	3	4	5	6	7
	TOTAL	**450**							

Risk Template

	Risk Name	Hours	Level of Risk (Circle your choice) Very Low			Moder-ate			Very High
1	Inaccurate valuation of investments.		1	2	3	4	5	6	7
2	Insufficient R&D spending resulting in declining product performance and acceptability.		1	2	3	4	5	6	7
3	Inability to purchase necessary components of inventory from suppliers.		1	2	3	4	5	6	7
4	Compensation insufficient to retain competent personnel.		1	2	3	4	5	6	7
5	The Company's environmental policies and procedures do not adequately prevent environmental issues.		1	2	3	4	5	6	7
6	Inadequate warranty reserves established for products sold under warranty.		1	2	3	4	5	6	7
7	Inadequate inventory reserves due to obsolescence and declining market conditions..		1	2	3	4	5	6	7
8	Collectibility of receivables due to insufficient credit extension policies to new and existing customers.		1	2	3	4	5	6	7
9	Technical support services are inadequate to ensure customer satisfaction.		1	2	3	4	5	6	7
10	Inadequate policies and procedures over deferred revenue resulting in misstated sales.		1	2	3	4	5	6	7
11	Significant profits will not be earned to recover investment in property, plant and equipment.		1	2	3	4	5	6	7
	TOTAL	**600**							

APPENDIX N

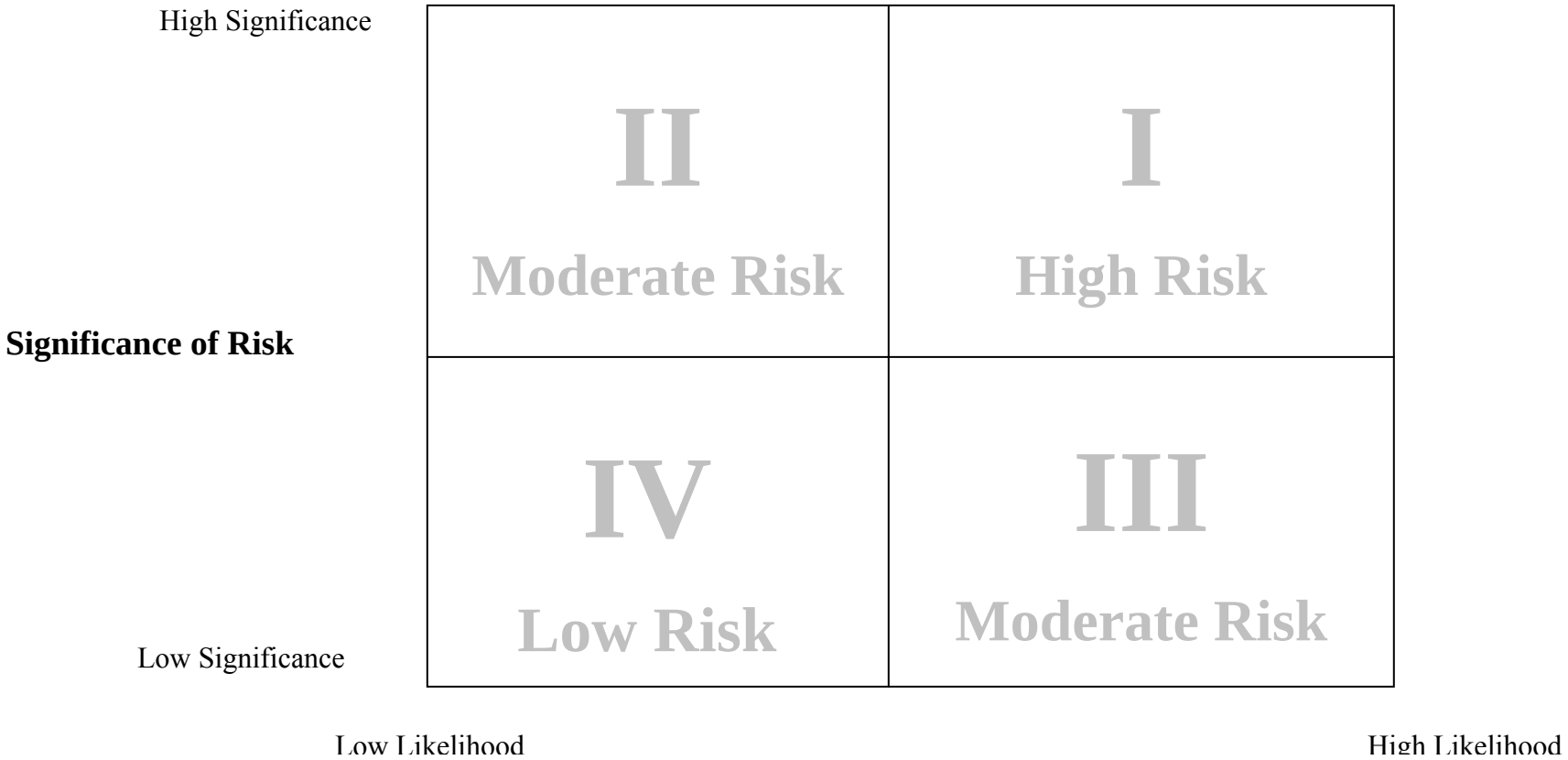
RISK ASSESSMENT MATRIX AND INSTRUCTIONS

RISK ASSESSMENT TOOL

Instructions

1. **Write** on the chart on the next page to help you assess the level of each risk the manager has listed in the Risk Template.
2. **Plot** the number of each risk on the chart by assessing the significance and likelihood of occurrence for each risk.
    a. The vertical axis is the significance axis. As you perceive a risk to be more significant/material to the audit, it should be plotted higher on the chart.
    b. The horizontal axis is the likelihood axis. As you perceive a risk to be more likely to occur, it should be plotted further to the right on the chart.
    c. Determine where the intersection of the significance evaluation and the likelihood evaluation will fall. Use this to help you assess the overall risk level on the 1 to 7 scale included in the risk template. Circle your final assessment in the risk template.
    d. For example **if you believe that risk "4" is very significant, but highly unlikely, you should write the number 4 in quadrant II. This quadrant represents moderate risks, therefore you will make your overall assessment in the 3-5 part of the scale in the Risk Template.**

Risk Assessment Tool



VITA

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